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THE DEVELOPMENT AND IMPROVEMENT OF DIRECTED WORK EXPERIENCE PROGRAMS IN EXPANDED VOCATIONAL EDUCATION OFFERINGS IN AGRICULTURE AT THE SECONDARY SCHOOL LEVEL. FINAL REPORT.

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The project objectives were to (1) develop empirically tested guidelines and procedures for initiating, developing, and operating cooperative education programs for secondary students in off-farm agricultural occupations, (2) evaluate the effectiveness of cooperative work experience, and (3) determine the effect of the extent of work experience on educational and occupational criteria. The sample included 35 students in agricultural mechanics and 68 students in ornamental horticulture from 16 high schools. Students from 10 high schools were used as a comparison group. Teachers, students, and employers endorsed the effectiveness of the guidelines and procedures used as the structural model. When compared with students enrolled in similar programs without work experience student engaged in directed work experience rated higher in technical knowledge, entry into curriculum-related employment following graduation, and entry into curriculum-related programs of advanced training. No differences were observed in the criterion performance of students with high and low amounts of occupational experience hours. Lists of contributing personnel, instruments used, and scaling models are included in the appendix. Other documents of this series are available as VT 005 938, VT 006 447, and ED 019 494. (DM)

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June 1968

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Project No. 50161
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Harold R. Cushman
Charles W. Hill
John K. Miller

June 1968

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A Statutory College of the State University
at
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Appendix A.

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The Authors
June 1, 1968

I. SUMMARY

The principal objectives of this study were to formulate, test empirically, and evaluate the effectiveness of procedural directives for planning, establishing, and operating a curriculum-coordinated program of directed work-experience for students of off-farm occupational specialties in vocational agriculture at the secondary school level. Synthesizing the knowledge and experience of experts and successful innovators in the field, the investigators developed a detailed manual of operational directives to guide teachers of vocational agriculture responsible for coordinating programs of supervised work-experience. These directives were published in the summer of 1966 as Tentative Guidelines and Procedures for Directed Work-Experience Programs in Expanded Education Offerings in Agriculture.

Teachers of vocational agriculture in sixteen schools located in the Northeastern Region of the United States systematically implemented these directives in conducting their work with senior students of vocational agriculture during the period July 1, 1966 through June 30, 1967. Included among participating programs were nine preparing students for work in ornamental horticulture and seven in agricultural mechanization.

Essentially the programs involved the placement of students for directed work-experience with participating employers who agreed to provide remunerated work-experience, on-the-job instruction, and individualized supervision at work. Teachers assumed the principal responsibility for coordinating the content of school instruction with the student's work-experience. A total of 103 students engaged in directed work-experience under the auspices of programs governed by the Guidelines and Procedures.

Throughout this try-out phase of the study, project staff kept a close and careful check on progress in the Try-Out Centers, as schools with participating programs were labeled. Through frequent contacts with teachers, students, and employers, problems were diagnosed, assistance and advice provided, and progress evaluated.

In order to assess the guideline's acceptability, their contribution to the success of the vocational program, and their practicability, the guidelines were submitted to the evaluative judgment of their most competent critics -- the teachers, students, and employers who had put them into practice over the period of a full year. Questionnaires were devised to identify the guidelines with which each respondent had experiential familiarity, and to determine the categorical and comparative importance of each guideline in the estimation of experienced respondents. Findings revealed that all three groups decisively endorsed the value and utility of the essential core and substance of the Guidelines and Procedures. The conclusions drawn from this aspect of the inquiry are that the Guidelines and Procedures successfully withstood a rigorous empirical trial and represent a useful and acceptable structural model for the organization and conduct of directed work-experience programs in vocational agriculture.

The analytic method employed in the evaluation of group responses to the questionnaires was Thurstone's judgment scaling technique. The group judgments of teachers, students, and employers were analyzed separately to determine the categorical importance or unimportance of each guideline and to identify the comparative importance or priorities among the guidelines.

As a partial result of these findings, in conjunction with the observations of the investigators and the personal reports of participating teachers, the Guidelines and Procedures have been revised where necessary and published as Cornell Miscellaneous Bulletin 91 of the New York State College of Agriculture, June 1968, entitled The Teacher-Coordinator's Manual for Directed Work-Experience Programs in Agriculture.

In order to evaluate the effectiveness of directed work-experience with respect to the educational and occupational objectives of vocational agricultural education, the performance of program participants on selected criteria was compared with the performance of students enrolled in similar courses of study. Schools selected for this purpose offered typical programs of classroom instruction and a school-based practicum of shop, greenhouse, or nursery projects. Comparison Centers, as they were labelled, met all the criteria laid down for the selection of a school as a Try-Out Center except that during the try-out phase of the project they did not offer students an opportunity to engage in directed work-experience. Comparisons were made between Try-Out and Comparison Centers on the following criteria:

- The proportion of students who actually obtained employment experience in any capacity during the period of the try-out phase;
- The proportion of students who actually obtained curriculum-related employment during the same period;
- The achievement of students in technical knowledge and competence as measured by multiple-choice achievement tests;
- A measure of attitude toward work (the Brayfield-Rothe Index of Job Satisfaction);
- The proportion of students who, upon graduation from high school, entered upon curriculum-related employment or advanced study in agricultural science.

The results in all instances except the comparison for level of job satisfaction showed statistically significant differences between Try-Out and Comparison Center students. The differences, as hypothesized, favored the superior effectiveness of the directed work-experience programs. Note that Comparison Center programs had satisfied currently accepted standards of excellence as a criterion of selection for inclusion in the study. The superior attainment of directed work-experience participants represents, therefore, a notable improvement in the effectiveness of vocational training

in agriculture with respect to relevant criterion variables.

In addition to evaluating the Guidelines and Procedures and studying the effectiveness of directed work-experience governed by the guidelines, the study also turned its attention to an important related issue, the effect of the extent of work-experience upon criterion performance. This has a direct bearing upon the justification, questionable in the estimation of the investigators, of imposing the customary, rigid, and arbitrary minimum work-experience requirement prescribed in many quarters for vocational students.

Students who engaged in directed work-experience at Try-Out Centers were permitted within flexible limits to exercise control over the extent and duration of their employment. It was hypothesized that under such conditions the criterion performance of "high" and "low" experience students (groups divided at the median number of hours worked) would fail to support the relevance of the amount of work-experience obtained. "High" and "low" experience groups were compared for group differences on the same criteria used to evaluate the effectiveness of Try-Out Center programs vs. Comparison Center programs. In addition, a comparison was also made between "high" and "low" experience groups for differences in job performance ratings assigned by employers or work supervisors. For this purpose a Work Rating Scale was devised which included evaluation of a wide range of worker-traits.

On all criteria except the Work Rating Scale differences in criterion performance were negligible, as expected. On the Work Rating Scale a difference, significant at the .05 level, was observed on mean ratings. Substantially higher ratings were assigned students who fell in the "high" experience category. However the difference was quantitative rather than qualitative, since even the "low" experience group consistently earned high performance ratings. Moreover, evidence was also found in a study of employer concerns and expectations regarding experience programs to imply strongly that employers are predisposed to assign higher performance ratings to students who engage more extensively in directed work-experience. The approach adopted to investigate the effects of the extent of work and the justification of a minimum requirement precludes a definitive conclusion. However, the results strongly imply that student self-determination in this matter may well be as effective as the imposition of arbitrary requirements.

In addition to the final report of research findings, this study has resulted in the preparation of companion materials which, the authors feel, represent a positive contribution to the study and the development of work-experience practices in vocational agricultural education. Mention has already been made of the Guidelines and Procedures and The Teacher-Coordinator's Manual for Directed Work-Experience Programs in Agriculture. There has also been published a descriptive study, The Concerns and Expectations of Prospective Participants in Directed Work-Experience Programs, representing a substantial portion of the spade-work done in anticipation of the major research effort. A set of overhead and 2x2 projection

slides outlining the highlights of the Guidelines and Procedures and their evaluation have been prepared. It is anticipated that they will prove useful in public presentations, in teacher preparation, and in the in-service training of vocational teachers. Finally, the project has resulted in a doctoral dissertation by Arsenio O. Gagni, one of the graduate assistants to the project. His study is entitled "The Differential Prediction of Selected Measurements in Ornamental Horticulture".

II. INTRODUCTION

A. The Problem:

This project has been devoted essentially to the development, trial, and evaluation of a progressive and innovative approach to secondary vocational education for off-farm agricultural occupations. Traditional programs in vocational agricultural education no longer prepare students adequately for the growing number of occupations that require agricultural knowledge and skills other than farming. The increasing demand for competent personnel in these occupations and the continued emergence of new occupations in urban, suburban, and rural environments offers a challenging opportunity to the vocational educator.

The passage of the Vocational Education Act of 1963 has vastly broadened the task of vocational education and added many new fields of training to the traditional concerns of vocational educators. Funds for training programs in agriculture, moreover, may now be used for "...vocational education in any occupation involving knowledge and skills in agricultural subjects, whether or not such occupations involve the work of the farm..."¹ Furthermore, a main purpose of the Act is to provide training programs wherein individuals can prepare for the entire spectrum of occupations not requiring a baccalaureate degree. Vocational education in the future, therefore, will deal with an expanded clientele drawn with increasing frequency from urban and suburban settings.

The Panel of Consultants² was alert to the educational implications of a mushrooming labor force in an expanding economy that increasingly places a premium on technological competence. The Panel identified many of the vital vocational needs of the new clientele to be served within the expanded framework of vocational education:

1. An increasingly urgent need for orientation to, and meaningful experience in, the world of work to compensate for the decline of such opportunities in the home settings of an ever more mechanized and urbanized society.
2. The need for students from economically handicapped homes to earn money to supplement family resources while in school.
3. The need to stay in school for a greater span of years in training programs which provide opportunities to acquire skills, to earn money, and to gain experience in and an appreciation of the world of work.
4. The need to learn at an early age the dignity of labor and the pride of workmanship; of special significance to the handicapped.
5. The need to obtain realistic work experience in technologically up-to-date settings; a situation more apt to be found on-the-job than in contrived settings of the classroom or school shop with their vulnerability to technological lag.

6. The need to develop attainable goals and occupational aspirations of a constructive nature through direct and personal involvement in the world of work.

Vocational education is clearly at a crossroad. The productive utilization of society's human resources potential and the attainment of individual vocational satisfaction by greater numbers of American youth will be increasingly contingent on meeting these critical needs. Agricultural Education is but a specific example of the necessity for drastic revision in school programs that prepare youth for entry into the adult world of work. Articulation must be firmly established between the formal educational experience of the vocational student and his embarkation upon a lifelong task of productive employment, self-support, and personal development.

The traditional concept of work-experience in Agricultural Education, the supervised farming program on the home farm under the guidance of parents and teachers, must be replaced by work-experience based upon a reassessment of student needs in light of realistic opportunities and aspirations. The objectives outlined for vocational education by the Panel of Consultants² point unequivocally to the need for directed work-experience programs: programs of remunerated work-experience in commercial, out of school settings; programs offering close and careful coordination of school instruction and on-the-job learning; and programs involving cooperative arrangements and clear commitments on the part of the student, employer, parents, and school.

As all the fields of vocational education expand their offerings to meet the changing educational demands of the contemporary occupational structure, all are likely to face the problem of building effective directed work-experience programs. A crucial aspect of this development will be the preservation of the best from the past and its integration with the most promising of innovative practices. The unique contribution of this study rests in its effort to devise specific procedures for developing, operating, and improving such programs and to subject those procedures to empirical trial in real school and employment settings. It is an initial step toward filling the gap between speculation and educational practice in an area of vocational education where opinion abounds and experience is limited.

B. The Objective:

The purpose of this study has been, basically, the development of a practical organizational guide to the effective planning, initiation, and operation of a program of directed work-experience for vocational students at the secondary school level. This purpose imposed upon the research team a four-fold task.

Task 1: The synthesis of a set of tentative directives, or Guidelines and Procedures, to govern the efforts of selected teacher-coordinators in developing and conducting directed work-experience programs. This

synthesis evolved from a consortium of progressive and innovative practices and ideas drawn from numerous creative sources -- the printed word, a panel of consulting experts, group conferences with experienced teachers of vocational agriculture, and personal consultations with the developers of imaginative and successful vocational programs across the United States.

Task 2: The empirical try-out of the tentative Guidelines and Procedures in school settings which offer one of two distinct specialized programs emerging in vocational agricultural education. This involved the orientation of participating teachers to the Guidelines and Procedures and close coordination of their year-long effort to implement the Guideline directives.

Task 3: An evaluation of the practicability and utility of conducting directed work-experience programs according to the directives proposed in the Guidelines and Procedures. The investigators agreed that, to conduct an adequate evaluation, it was necessary to pursue three distinct channels of inquiry:

a. Relative to the practicability of the Guidelines and Procedures, the experienced judgments of teachers, students and employers regarding each individual guideline were elicited. It was assumed that the importance attached to a guideline, in the light of experience with its application, would reflect both its perceived value and the prospect of its survival as an integral and functional aspect of directed work-experience. This phase of the investigation was strictly exploratory in its method and purely descriptive in purpose.

b. To assess the effectiveness of directed work-experience, it was necessary to compare the performance of program recipients with the performance of students enrolled in similar courses of study that did not afford an opportunity to engage in directed work-experience. The measures of performance selected represent criteria of educational and occupational achievement. Differences in criterion performance attributable to the presence or absence of the opportunity to engage in directed work-experience were hypothesized. The hypotheses were directional, favoring superior performance for students who engaged in directed work-experience.

c. A further question addressed itself to asking if educational and occupational outcomes support an arbitrary but widely accepted contention that a minimum amount of student work-experience is a significant factor in the success of vocational students. It was contended that, in the organized and carefully coordinated programs of directed work-experience conducted by the teachers participating in the project, achievement differences attributable to variation in the amount of work-experience would be minimized. This opposed the view that the measure of a program's success may be taken by the simple expedient of computing the amount of work-experience catalogued by students. Students whose directed work-experience exceeded a frequently recommended minimum number of hours were compared for differences on selected criteria with students whose directed

work-experience fell below the minimum. It was expected that differences between groups would fail to support the relevance of the arbitrary requirement.

Task 4: The revision of the Guidelines and Procedures incorporating additions and/or changes dictated by the evaluation; and the preparation, publication, and distribution of a companion manual discussing and elaborating upon the directives of the Guidelines and Procedures.

C. Survey of the Literature:

1. Theoretical Bases:

The theoretical framework and rationale for this study have been drawn from an extensive review of literature and research in vocational education. In this respect the study represents an intensive effort to wed in a productive union professional education's heritage of speculative scholarship and the demand for tangible solutions to specific problems of educational practice.

No single body of theory has had greater impact on vocational education than that dealing with experience as a factor in learning. The point of view expressed by Froebel⁴, "...to learn a thing in life through doing is more developing, cultivating, and strengthening than to learn it through the verbal communication of ideas," has long been accepted as the keystone of vocational education in the United States. In the words of John Dewey, the most influential thinker to emerge on the American education scene, "...education, in order to accomplish its ends for both the individual learner and for society, must be based upon experience which is always the actual life experience of some individual."⁵ Parker⁶ says it most directly and succinctly: "...real experience with actual material is essential for learning."

John Dewey, in framing a theory to guide the intelligent conduct of education based upon experience, described two "principles," which he believed to be significant: continuity and interaction in experience.

The principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after.⁷

The word 'interaction' ...expresses the second chief principle for interpreting an experience in its educational function and force. ...the statement that individuals live in a world means...that they live in a series of situations...it means that interaction is going on between an individual and objects and other persons. The conceptions of situation and of interaction are inseparable from each other. An experience is always what it is because of a transaction taking place between an individual

and what, at the time, constitutes his environment.⁸

Continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience. The immediate and direct concern of an educator is then with the situations in which interaction takes place. The individual who enters as a factor into it, is what he is at a given time. It is the other factor, that of objective conditions, which lies to some extent within the possibility of regulation by the educator.⁹

In the case of vocational education, Dewey's "learning by doing" theory became even more specific:

The only adequate training for occupations is training through occupations. The principle...that the educative process is its own end, and that the only sufficient preparation for later responsibilities comes by making the most of immediately present life, applies in full force to the vocational phases of education.¹⁰

Others have supplied additional dimensions to the theory of educational experience through their work in "learning theory." Two examples seem especially illustrative.

The principle of self-activity (or active response) states that an effective way to change the behavior of people is to have them participate actively in doing what is to be learned. "The kind of learning which takes place is the result of the kind of experience we have."¹¹ "Learning is an active process on the part of the learner."¹²

The principle of practice (or repetition) maintains that a learning activity experienced many times tends to be remembered longer and to be recalled easier.

Other things being equal, the oftener a situation connects with or evokes or leads to or is followed by a certain response, the stronger becomes the tendency for it to do so in the future.¹³

...perfection is seldom approached without practice... The attainment of perfection demands that awkward and useless movements be detached from their cues as well as useful movements attached to them.¹⁴

However, a number of authors, Townsend and Burke among them, have cautioned those who would view experience as an unqualified blessing.

...A background of experience both aids and hinders learning. Through experience, persons are

sensitized to various aspects and relationships of the self and the environment; but these experiences also provide inhibitory sets. Having successfully worked with material in one context, persons find changes to other contexts difficult; when inappropriate and false directions have been built up through experience, facilitation is further inhibited.¹⁵

The literature examined virtually ignored the amount of experience needed to influence learning effectively. However, some authors have questioned the effectiveness of extensive experience. For example, Bloom¹⁶ has pointed out, that the "...experiences of an individual may be so repetitious that later experience may not add to or alter what has been developed from previous experience." Moreover, Birch and Rabinowitz¹⁷ discovered, from studies measuring the effects of experience on problem solving, that when an individual learns an approach to problem solving he tends to persist in its use, even when it is ineffective.

2. Work-Experience in Vocational Education:

Although learning by doing has been widely accepted by vocational educators, it has had a variety of applications in work-experience programs in the several fields of vocational education.

a. Fields Other Than Agricultural Education

Vocational Industrial Education, operating under the Smith-Hughes and subsequent Acts pre-dating the Vocational Education Act of 1963, has been strongly influenced in the development of cooperative programs by the admonition "...that such schools or classes giving instruction to persons who have not entered upon employment shall require that at least half of the time of such instruction be given to practical work on a useful or productive basis, such instruction to extend over not less than nine months per year and not less than thirty hours per week..."¹⁸

Although variations in the vocational industrial cooperative programs have developed in the several states, the essential elements are fairly consistent. The purpose of the program is viewed as preparation for earning a living, and this end is sought through closely related part-time school instruction (usually mornings) and part-time work in industry (usually afternoons). In New York State the standards for program approval include:¹⁹

(1) Minimum hours of work - 15 hours per week or a total equivalent of 600 hours per year.

(2) Coordination of school and work, including development of a training outline prepared cooperatively with the prospective employer, and the services of a certified coordinator or teacher-coordinator who must have time scheduled for regular and frequent supervision of trainee activities.

- (3) Students 16 years of age or older.
- (4) At least one period per day of related instruction.
- (5) Legal employment of students with adherence to minimum wage laws.

Four basic conditions are advised prior to the establishment of programs.²⁰

- (1) School administration and faculty must understand and support the work-study plan.
- (2) The school population must be of sufficient size to insure a reasonable number of qualified applicants.
- (3) Adequate interest by students in cooperative employment training must be in evidence.
- (4) The community and neighboring districts must provide sufficient numbers of appropriate training opportunities.

In program organization and development the following factors are stressed: evaluation of program needs, screening of students, standards for program approval, organization of advisory groups, canvassing and interviewing potential employers, criteria for evaluating employment training, training outline development, legal requirements for trainees, employment limitations, coordination of related instruction, plans for classroom facilities, and record system development.²¹

Among the benefits claimed for these programs are:²²

Values to students

- Students have the opportunity to learn useful skills on real jobs under actual working conditions.
- As wage earners, students develop appreciation and respect for work.
- Students are aided in obtaining worthwhile jobs.
- Interest in classroom work is stimulated by the application of newly learned skills under real employment conditions.
- Ability to get and hold a job helps the young person adjust to the adult world.

Values to school

- The school is able to provide vocational training with minimum expense for shop and laboratory equipment.
- The skills and knowledge of outstanding individuals outside the school are coordinated in the training of young people.
- Equipment and facilities beyond the financial reach of the school are utilized.
- Teachers are in touch with changing employment conditions.
- The program reminds the public that education is a community-wide responsibility.

- Students who wish to leave school because it is not "practical" are more likely to remain.

Values to business and industry

- The screening and testing services of the school help employers obtain qualified trainees.

- Employers are assisted in analyzing jobs and devising training outlines.

- Business and industry are provided with the opportunity to participate in a community service.

- Local people are trained for local employment -- in the employer's way, under his own supervision.

- Related classroom instruction provides for a more thorough and extensive program of training.

Values to the community

- The vocational industrial cooperative program helps local students gain the skills and civic competence needed to help keep them employed within the community.

- Community-school relationships are developed.

- The cooperative program helps reduce the number of poorly-trained and ill-adjusted young people who might otherwise become a burden to the community.

Follow-up studies in the North Atlantic Region have consistently indicated that the vast majority of graduates from industrial cooperative programs have found initial placement in jobs related to their training. In 1962 this proportion was 86 per cent.²³

Bowinazos²⁴ in a study of the influence of trade and industrial education on the career patterns of high school graduates (who had been in the labor market from 1956-1962) concluded that changes in curriculum should be brought about which will provide high school graduates with better preparation for the world of work, that all students should be given an opportunity to participate in work-experience programs, and that the increasing burden of training specialists and technicians should be shared by management and labor in cooperation with the school system.

Business and Distributive Education has developed cooperative work-experience programs which parallel industrial education's cooperative program in several ways. Cooperative work-experience programs in this field have been defined as follows: work-experience education is "not mere employment of pupils but part-time employment under the supervision of the school both before and during the period of employment."²⁵

"The ideal way to obtain job competence is by supplementing a classroom laboratory and instruction with the learning opportunities of an actual job."²⁶

Initial success of a cooperative office skills or distributive education work-experience program is believed to depend on the school philosophy,

adequate school population, student interest, and appropriate work stations. In connection with the latter point it has been the experience of this field of vocational education that:

"Business is eager to cooperate with schools so that young men and women may be better prepared for their life-work."²⁷

However, Business and Distributive Education leaders in New York State maintain that students should not be denied classroom experience because they do not work. Students are allowed to enroll in course work without pursuing work-experience.

The objectives of a cooperative office skills or distributive education work-experience program have been stated as:²⁸

(1) Preparation of each participant for employment in an occupation in his field of interest.

(2) Opportunity to explore related jobs in order to gain increased knowledge and vocational competence.

(3) Opportunity to develop positive on-the-job personality characteristics.

(4) Opportunity to learn to work well with others.

(5) Opportunity to gain a sense of responsibility toward a job and to develop loyalties toward an organization.

(6) Opportunity to apply in practice theory presented in the classroom, and to add meaning to the related school program.

In the developmental phases of the program the following considerations are stressed:²⁹

(1) The teacher-coordinator as the key to success.

(2) The essential importance of advanced planning with the business community, school, students, and parents.

(3) The use of an advisory committee.

(4) The assumption of responsibility for curriculum by the school.

(5) An average of 15 hours a week of work for pay in a properly supervised, well regulated business during the 12th year.

Key points in the operation of the program are believed to be:

(1) The recruitment and selection of students.

- (2) The selection of appropriate work stations.
- (3) The planning of students' programs.
- (4) Granting of credit for work-experience.
- (5) Keeping parents informed.
- (6) Assignment of students to work stations.
- (7) Orientation of new student workers.
- (8) Supervision on the job.
- (9) Adaptation of in-school instruction to needs of student workers.
- (10) Evaluation of student progress.
- (11) Reports to administrators.
- (12) Public relations.
- (13) Adherence to employment regulations.

An investigation by Goldstein³⁰ of the validity of published figures showing high job retention among former business and distributive education cooperative students, indicated that 56 per cent of the pupils in his sample were employed one year after graduation by the firm that employed them as cooperative trainees. The former pupils stated almost unanimously that the cooperative program was of value to them in the business world.

Home Economics Education. The traditional goal of homemaking instruction in the secondary school has been "to help pupils develop into the kinds of persons and home members who will be able to assume successfully the complex responsibilities of homemakers."³¹ Accordingly, emphasis has been placed on home and community experiences as well as on classroom experiences.

However, Public Law 88-210 states that "at least 10 per centum of any amount so allotted (or apportioned) to a state for each fiscal year beginning after June 30, 1965, may be used only for vocational education to fit persons for gainful employment in occupations involving knowledge and skills in home economics subjects..."³²

This action by the National Congress has established an additional focus for home economics education.

Catherine Dennis,³³ State Supervisor of Home Economics Education in North Carolina, has recently stated three long-range objectives for home economics education:

"(1) To contribute to the education of the individual for home and family life.

(2) To prepare students for employment in occupations requiring home economics skills and knowledge.

(3) To motivate and recruit college-bound students for professional careers in the field of home economics."

Experimental programs with occupational emphasis are being undertaken in various parts of the country. Progress and results reported by many of these programs are very encouraging. Describing one such program at East Leyden High School, Franklin Park, Illinois, Helen Westlake cites fifty minutes of coordinated class, half-day work-experience and one credit each for coordinated class and work-experience. She reports that businessmen are enthusiastic; that work agreements, union membership, and training stations where supervisors will have patience with the trainee, are important aspects of the program; that the coordinating teacher has a vital role, and that jointly planned training agreements are central to her program. Forty students have participated. Of these 18 are still in training, seven have graduated and are gainfully employed in the area of their training, six have transferred to other work programs, four have dropped out of school, three have gone on for advanced study in the area of their training and two have joined the armed services.

The School to Employment Program (STEP). The Holding Power Project³⁴ conducted by the Bureau of Guidance and 89 New York State secondary schools between 1954 and 1960 showed that roughly one in every four of the potential graduates of these schools chose to leave before graduation. The severe post-school problems of these drop-outs included high unemployment, relatively low earnings, juvenile delinquency and the prospect of requiring public assistance of all types.

In 1962 legislation was passed in New York to permit school districts to set up School to Employment (hereafter referred to as STEP) Programs with the state matching local expenditures dollar for dollar.

The ultimate purpose of STEP is the reduction of unemployed drop-outs by encouraging their return to school or by assisting them to obtain and maintain satisfactory full-time employment.

The essential program elements include:

(1) A daily class session of at least one period devoted to orientation to school and work.

(2) Supervised work-experience in private or public agencies.

(3) Employment of a teacher-coordinator.

(4) Adherence to legal employment procedures.

- (5) Selection of potential drop-outs; at least 15 years old.
- (6) Dispensation from many routine school requirements.
- (7) School attendance in the morning and work-experience in the afternoon.
- (8) Emphasis on developing effective and improved attitudes toward school and work.
- (9) Frequent supervision of students by the teacher-coordinator.
- (10) Utilization of sympathetic work-station supervisors.
- (11) Close coordination with parents.
- (12) Periodic assessment of progress.

Those in charge of STEP report that:

"There is abundant evidence that the opportunity to learn appropriate responses to the demands of the world of work in 'real' employment situations generally does result in the attitudinal maturation which the program is designed to foster."³⁵

Work-Study Programs Operated Under Public Law 88-210, Part A, Section B of the Vocational Education Act of 1963. This work-study program is designed to provide part-time employment for youths who need the earnings to commence, continue, or return to their vocational training on a full-time basis. It is administered by local educational agencies for capable students who are at least 15 years of age and less than 21 years of age and who in the opinion of school authorities need earnings to commence, continue or return to their vocational education program. Students may be employed for as many as 15 hours per week and earn a maximum of \$45.00 in any month or \$350 in any academic year (some exceptions allowed).

The students are employed in public institutions such as courts, libraries, playgrounds, schools, etc.

Program development suggestions include:³⁶

- (1) The use of a local advisory committee.
- (2) Careful selection of students.
- (3) Coordination of the program by a work-study supervisor or counselor.
- (4) Adequate scheduled time for the work-study supervisor or counselor to perform his coordination and counseling duties.
- (5) Adult supervision while on the job.

(6) Job placement which utilizes the abilities and interests of the student which are related to his vocational education goals; to the greatest extent possible.

(7) Adherence to legal employment procedures.

(8) Adequate records.

b. Work-Experience Programs in Agricultural Education

From 1917 to 1963 the declared purpose of vocational education in agriculture has been to prepare present and prospective farmers for proficiency in farming. The Smith-Hughes and subsequent Acts prior to the Vocational Education Act of 1963 mandated "directed or supervised practice in agriculture, either on a farm provided for by the school or other farm, for at least six months per year." Supervised farming programs have, therefore, traditionally taken place on the farm under cooperative arrangements between students, parents (or cooperating farmers), and teachers of agriculture. The literature of Agricultural Education is replete with innumerable descriptive studies and "how to do it" manuals addressed to such concerns as: selecting farming programs, developing cooperative relationships in connection with the students farming program, assisting the student in starting and further developing his farming program, supervision of farming programs, etc. No attempt will be made at this point to review such works since they are well known to the profession and are readily available.

The passage of the Vocational Education Act of 1963 vastly broadened the task of vocational agriculture and funds for training programs in agriculture were made available for "...vocational education in any occupation involving knowledge and skills in agricultural subjects, whether or not such occupations involve the work of the farm."³⁷

Current research efforts in agricultural education have set the stage and provide a base for an intensive effort in the area of developing and evaluating work-experience programs. Leaders in agricultural education throughout the nation are currently engaged in a study of the off-farm agricultural occupations. An extensive effort in New York State to discover: (1) the specific job titles in which agricultural competencies are required, (2) the proportion of time devoted to use of such competencies, (3) the number of persons employed in such occupations and the outlook for employment, (4) the typical levels of employment, (5) the specific agricultural competencies needed by workers, and (6) the educational prerequisites for entry into such occupations, has been completed recently at Cornell University.³⁸ This study has shown a vital need for training programs in Agricultural Business; Agricultural Mechanics; Forestry, Conservation, and Outdoor Recreation; and Ornamental Horticulture. Core courses of study based on the competencies employers demand of workers in these occupations have been formulated by the Joint Staff of Supervisors and Teacher Educators in Agriculture in New York State and by the National Center for Advanced Study and Research in Agricultural Education at Ohio State University. These curricula are now in the process of try-out and evaluation.

Those who have experimented with work-experience programs in vocational agriculture have reported findings which parallel results in other vocational fields.

Juergenson and Davis³⁹ reported from California that:

(1) Executives of related agricultural industry would cooperate in a work-experience program.

(2) Employers expected to pay respectable wages.

(3) Every employer (except one) agreed to provide a variety of work situations in order to give students a wide range of experience.

(4) Supervision by the teacher was expected and welcomed.

(5) Most cooperators preferred high school students in the junior and senior age brackets.

(6) Neither insurance nor labor union regulations were found to be impediments.

(7) Permission of parents was necessary.

(8) Opportunity for work-experience was sufficient to justify the development of programs.

(9) Instruction in safety practices and an orientation to employment practices were found to be essential components of curriculum.

(10) The benefits claimed for work-experience included job experience, supplement to classroom instruction, insight into opportunities in agriculture, earning opportunities, and increased appreciation of vocation.

Harris,⁴⁰ reporting on his experience in Maryland, affirmed:

"We have found in our area that employers are eager for a source of employees who understand their business and, even more important, understand farmers."

Fraser,⁴¹ describing his program at Kingston, Massachusetts, pointed out that a broad supervised work-experience program in off-farm agricultural occupations rounds out the curriculum in farm-related occupations and added that his employee training program benefits both management and student.

Yetman,⁴² citing the results of a survey of employers, writes:

"There are many opportunities for students of vocational agriculture to receive training on-the-job through placement in landscape gardening. Of fifty employers surveyed, 36 said they would hire students."

Binkley,⁴³ citing progress of pilot programs for training workers in non-farm agricultural occupations in Kentucky, summarized his comments regarding work-experience as follows:

"A total of 39 twelfth grade students were enrolled in the four pilot programs. All boys except four completed over 100 hours of work-experience in the agricultural businesses...We are most gratified by the splendid response and cooperation of teachers, school administrators, and owners and operators of the agricultural businesses where the students have received their occupational experience."

III. METHOD

A. Preparation of the "Guidelines and Procedures":

The initial phase of the project was devoted to the development of the Tentative Guidelines and Procedures for Directed Work-Experience Programs in Expanded Vocational Education Offerings in Agriculture.⁴⁴ This publication concisely outlines the basic structural details of a program of directed work-experience and the essential sequence of events required to initiate and operate the program.

In developing the Guidelines and Procedures, the investigators relied upon numerous sources of information, advice, and experience both within and without the field of vocational education:

1. An extensive survey of the literature yielded a synthesis of relevant publications and articles from sources which cut across the disciplinary divisions within vocational and occupational education.⁴⁵
2. The assistance of state bureaus and divisions of vocational and occupational education in sixteen states was sought in identifying outstanding examples of successful innovation in vocational education. Subsequently, considerable time was devoted to observing operations and consulting with teachers, employers, students, and administrators associated with 14 innovative programs located in Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New York, and Virginia. APPENDIX A.
3. An eleven-member Panel of Consultants, representing competence in diverse areas of critical importance to program development, contributed individually and in a group conference at Cornell University to the development and improvement of the Guidelines and Procedures.⁴⁶ Appendix A.
4. Interview schedules were prepared and administered to a selected sample of prospective participants in programs of directed work-experience. Interviewees represented the three groups whose ends must be met by a productive program -- student candidates for directed work-experience, their parents, and employers who ultimately set the standards for employment. The "hopes" and "fears" of these three groups regarding participation in a program of directed work-experience were surveyed through semi-structured interviews. The objective of this effort was to help formulate a description of the appropriate situational context for conducting directed work-experience. The results of this investigation and the instrumentation used are reported in a separate publication.⁴⁷
5. Finally, the eighteen teachers of vocational agriculture, who were to conduct the trial application of the Guidelines and Procedures

in their schools, contributed substantially to the development of the manual at two group conferences held at Cornell University in spring and summer, 1966.

During the summer of 1966 the working draft of the Guidelines and Procedures was prepared, printed, and distributed for use in the try-out phase of the project.

B. Try-Out of the Guidelines and Procedures:

The ultimate test of a procedural model is its ability to withstand the rigors of empirical trial. Consequently, 18 high schools with specialized programs in vocational agriculture were invited to participate in the try-out phase of the project. The administration and vocational agriculture teachers in these schools agreed to make a concerted effort during the 1966-67 school year to implement in minute detail the directives laid down by the Guidelines and Procedures for planning, initiating, and operating a program of directed work-experience.

1. Selection of Try-Out Centers: Criteria and Method:

a. Since the Guidelines and Procedures were formulated to apply equally to different specialties within Agricultural Education, and hopefully even to other disciplines within the broader field of vocational-occupational education, it was decided to include among the participating schools two diverse types of vocational agriculture programs. Programs in ornamental horticulture and programs in agricultural mechanization were the areas of concentration selected. The rationale underlying these choices was two-fold. Both programs deal with areas that have well developed and sophisticated technologies. On the other hand, the disparity between the two areas in terms of learning objectives was maximized. The incorporation of these factors in the design for the try-out made it possible to investigate the functional properties of the Guidelines and Procedures under two different kinds of highly demanding conditions. Participation in the try-out was restricted to schools which had offered a course in agricultural mechanization or ornamental horticulture during the 1965-1966 school year.

b. In accord with the aim of investing the Guidelines and Procedures with broad applicability, it was deemed necessary to transcend as far as possible the impact of geographic, topographic, and demographic factors on educational, economic, social, and employment conditions. It was decided, therefore, that the try-out centers should be distributed in a manner that would represent a diversity of geographic, topographic, and demographic locales. In order to meet this criterion, an effort was made to establish try-out centers that conformed to all the other selection criteria across a twelve-state region of the northeastern United States. Ultimately, project participants represented the seven states of New York, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Maryland, and West Virginia.

c. The number of prospective students who could be expected to participate in a program of directed work-experience was a consideration of major importance. Numbers had to be taken into consideration both in assessing the feasibility of offering directed work-experience in a school and to maximize the likelihood of obtaining a reasonably adequate amount of research data. To meet this exigency, the invitation to participate in the project was restricted to schools whose programs had enrolled at least ten juniors and seniors in 1965-1966. It was presumed that this would insure participation by a minimum average of five seniors per school for the programs engaged in the project.

d. Another relevant factor in selection was the sufficiency of placement opportunities in the community capable of providing curriculum-related work-experience. Selection was restricted to programs that appeared to have in the patronage area of the school an adequate number of commercial enterprises appropriate for student placement in ornamental horticulture or agricultural mechanization.

e. As a matter of prudence, invitations to participate in the project were extended only to schools where administrators and teachers of agriculture registered a reasonable level of interest and enthusiasm for the project, as outlined in an abstract of the proposal.

f. And, finally, invitations to participate were reserved to schools approved and recommended by the state supervisor of agricultural education. This restriction served two important purposes: it avoided encroachment upon the authority and domain of state officials; and it capitalized upon the familiarity of supervisors with local conditions over extensive geographic areas.

After canvassing extensively for prospective try-out centers by mail and telephone communication, approximately 35 schools were visited and evaluated for participation in the project. Of this number, 18 schools were selected and invited to participate. All accepted.

2. Pre-Training Conferences and Orientation of Teachers:

Two conferences for the teacher-coordinators of directed work-experience were held at Cornell University on April 29 and July 6-8, 1966. At these meetings the teacher-coordinators were oriented to the specific objectives of the project and to detailed plans for carrying them out in the try-out centers. In general meetings and in small group discussions led by the project staff, the teachers were familiarized with their role in the initiation and operation of a directed work-experience program governed by the Guidelines and Procedures. Ample opportunity was afforded for clarification of the meaning and intent of the specific directives contained in the Guidelines and Procedures. And as a final effort to refine the tentative guidelines before subjecting them to empirical trial, suggestions for additions, improvement, modification, and deletions were solicited from the teachers. From the conferences there emerged, for use in the try-out, a working draft of the directives which was supported by a consensus of the participating teachers.

3. Try-Out of Guidelines and Procedures:

During the remainder of the summer, 1966, and throughout the 1966-1967 academic year, the teachers initiated and coordinated programs of directed work-experience for their senior students of vocational agriculture. Throughout this period the Cornell-based project staff maintained frequent contacts with the teachers by mail, telephone, and personal visitation of Try-Out Center schools. The purpose of these contacts was to insure through observation, evaluation, discussion, and suggestions the systematic implementation of the Guidelines and Procedures within the limits of flexibility dictated by local conditions. A total of 65 such visits were made by Project staff between June 1, 1966 and June 30, 1967. The visitation of Try-Out Centers was not conducted on a rigid schedule of periodic visits. Time and frequency were individualized and governed by staff-evaluation of teacher progress and need for assistance or encouragement.

The tasks which the teacher-coordinators undertook to perform during the try-out in accordance with the directives specified by the Guidelines and Procedures include administrative, public relations, and teaching responsibilities. The principal duties of the teacher-coordinators are described briefly below.

a. Administrative: Secure the cooperation of school administrators in the establishment of school policy; plan with guidance personnel for student referral, selection, and scheduling; explore the placement prospects for students in the community; nominate, establish, and meet with an advisory board of agricultural employers to assist in cultivating placement opportunities, evaluating curriculum, and solving problems of organization and operation; select curriculum-related businesses for student placement and prepare employers for participation; arrange placement interviews for students; and maintain contact with employers throughout the duration of student placement.

b. Teaching: Plan and conduct a course of study that effectively complemented the student's directed work-experience with technical knowledge, work skills, and orientation to the benefits and responsibilities of adult employment.

c. Public Relations: Inform students of the opportunity to participate in directed work-experience; encourage the good will and cooperation of parents; interest the business community in the organization and progress of the program; and bring the program to the attention of the community at large.

C. Evaluation of Try-Out:

It was necessary, in view of the objectives of this study, to conduct three distinct evaluation efforts. The first involved evaluating the Guidelines and Procedures as such for their acceptability and utility as a structural model for programs of directed work-experience. The second

evaluation objective consisted in assessing, with respect to selected criterion variables, the effectiveness of directed work-experience programs governed by the Guidelines and Procedures. And thirdly, the differential effects of the extent of directed work-experience on the criterion performance of students were examined.

1. The Sample:

a. Try-Out Centers: Persons associated with the trial of directed work-experience in the Try-Out Centers fall into three categories as a function of their role: students, teachers, and employers. The 18 Try-Out Centers, selected as described above, were equally divided between specialized programs in ornamental horticulture and agricultural mechanization.

(1) The students who participated in directed work-experience at the Try-Out Centers were all seniors and numbered 103 from a total senior enrollment of 167. These totals represent 35 students in agricultural mechanization from an overall enrollment of 63, and 68 students in ornamental horticulture from an overall enrollment of 104. Groups at individual Try-Out Centers ranged in size from five to 22. TABLE 1 represents these figures as percentages of total enrollment for each program and for both programs combined.

TABLE 1: Students Placed for Directed Work-Experience as a Percent of Total Enrollments

	<u>Agricultural Mechanization</u>	<u>Ornamental Horticulture</u>
Percent of Program Enrollment	55.5	65.4
Percent of Combined Enrollment	20.9	40.7

(2) The teacher of agriculture for each participating program served as teacher-coordinator in the initiation, organization, and operation of the directed work-experience program. A total of 16 teachers, nine in ornamental horticulture and seven in agricultural mechanization, actually participated. After accepting the invitation to participate, two programs in agricultural mechanization failed to honor their commitments. Extensive efforts to engage even token participation were unavailing. Unfortunately, the immobility of those involved did not become apparent in time to replace them with more cooperative participants.

(3) Employers who hired students for directed work-experience were, for the most part, independent local businessmen having relatively small payrolls. Though one large farm implement manufacturing company hired several students, most employers provided work-experience for a single trainee. As a rule, therefore, students found themselves working in contexts where the individual's productivity made a notable and noticeable contribution to the business operation and where contacts among

employees were fairly intimate.

b. Comparison Centers: One objective of the inquiry represented an attempt to identify the nature and extent of results specifically attributable to participation in the directed work-experience program. It was necessary, therefore, to provide for differential comparisons between the responses or criterion performance of those associated with directed work-experience and responses or criterion performance of comparable non-participant groups.

Accordingly, ten schools offering specialized courses of study, five in ornamental horticulture and five in agricultural mechanization, were selected as Comparison Centers. These schools met all the criteria established for the selection of Try-Out Centers. Furthermore, in geographic location they were distributed in a manner proportional to the geographic distribution of the Try-Out Centers. An additional requirement was assurance that the students in these programs, though pursuing a specialized course of study in one of the two subject areas, were not engaged in formally structured directed work-experience.

The persons associated with the specialized courses of study in the Comparison Centers fall into two categories: students and teachers. In the absence of formally structured work-experience, there were no employers directly associated with the course of study.

(1) The student subjects enrolled in the Comparison Center programs were all seniors and numbered 139 in all. Of these, 65 or 46.7 percent were enrolled in the five ornamental horticulture programs, and 74 or 53.2 percent were enrolled in the five agricultural mechanization programs. These senior student groups from individual Comparison Centers ranged in size from nine to 23.

(2) The teacher sample included the vocational agriculture teacher at each Comparison Center who was primarily responsible for the senior course of study in agricultural mechanization or ornamental horticulture. In all, ten teachers, five for each of the two specialties, were involved.

2. Evaluation Objective #1: Guidelines and Procedures:

a. The Instruments:

It was assumed that the practicability and utility of the Guidelines and Procedures would hinge upon the acceptance they attained from the persons most intimately affected by them. To tap this source of information, three series of instruments, each containing three questionnaires, were constructed for administration to students, teachers, and employers, respectively. Each series of questionnaires reflects the role specifically assigned to one of these groups by the Guidelines and Procedures.

In each series, Questionnaire A requires the respondent to identify the particular activities or responsibilities assigned to him by the

Guidelines with which he had first-hand experience in the performance of his own role. Questionnaire B requires the respondent to judge, relative to program success, the importance or unimportance of performing each activity or responsibility. Questionnaire C requires the respondent to judge, using the rank-order method, the relative contribution of functionally related directives to program success. The content validity of the questionnaires is manifest; the items simply replicate the directives relevant to the respondent's assigned role in the directed work-experience program. The measurement objective, moreover, is simply a straightforward summarization of reported group experience (Questionnaire A) and reported group reaction (Questionnaires B and C). These questionnaires are reproduced in APPENDIX B.

From a purely pragmatic viewpoint, evaluating the propriety of individual guidelines or directives on the basis of these summary measures of group response is quite defensible. The prospects for the survival of any directive in a real educational setting is clearly contingent upon the allegiance it can continue to command from relatively autonomous teachers, students, and employers. On the practical plane, therefore, the level of enthusiasm registered for a guideline by those experienced in its use provides an apt yardstick for assessing its prospects for continued acceptance and implementation in programs of directed work-experience.

b. Administration and Scoring of Questionnaires:

Each teacher, student, and employer associated with the directed work-experience program in the Try-Out Centers was asked to complete all three questionnaires pertaining to his particular role in the program. For each guideline the evaluative responses of those reporting experience with its application were tabulated for analysis. Teacher, student, and employer responses were tabulated separately.

c. Analysis of Data:

The data matrices resulting from the tabulation of item-responses to Questionnaires B and C were subjected to Thurstone-type judgment scaling procedures (Categorical Judgment Model).⁴⁸ The scale value for each individual guideline was computed separately for each of the following groups:

- (1) Try-Out Center Students
- (2) Try-Out Center Teachers
- (3) Try-Out Center Employers

The scaling methods used locate each guideline descriptively on the bipolar attitudinal continuum of "importance" and locates the point on the scale that separates item-importance from item-unimportance. The result is a descriptive summary measure of each guideline's value. It should be noted that the purpose in evaluating the individual guidelines is purely descriptive and makes no pretense to statistical inference. The inquiry

is content to seek illumination on how the guidelines were perceived as functioning in a specific group of Try-Out Centers.

The results of the scaling analyses were subjected to critical and interpretative examination in order to answer the following questions:

1. With respect to the respondents experienced in the operation of directed work-experience programs:

(a) How much importance is attributed to each guideline by student? By teachers? By employers?

(b) What are the priorities among the guidelines with respect to each of these groups?

2. Do notable discrepancies appear among patterns of guideline priorities as a function of group role in the program? That is, are the priority patterns characteristic of students, teachers, and employers discrepant?

3. Evaluation Objective #2: The Effectiveness of Directed Work-Experience.

To assess the contribution of the directed work-experience program toward enhancing the attainment of worthwhile educational objectives, the performances of Try-Out Center students and Comparison Center students on selected criteria were subjected to differential group comparison. The expected effects of Try-Out Center programs fall into two broadly defined classifications. The first represents the effect of providing all students in a class the opportunity to participate in directed work-experience. The second classification represents the effects on the students who elected to avail themselves of the opportunity.

a. The investigators anticipated that cultivating a clearly structured opportunity for students to acquire work-experience related to their course of study and to their vocational aspirations would have notable impact on certain characteristics exhibited by the total student group:

(1) With respect to school retention rates, it was expected that an atmosphere oriented to practical world-of-work skills, knowledge, needs, problems, and experiences would motivate greater numbers of students to greater interest in school. Hypothesizing a lower drop-out rate for Try-Out Centers, the total enrollments in programs at Try-Out Centers and Comparison Centers were compared for a difference in rate of school retention.

(2) It was expected also that the stress laid on the educational and vocational importance of gaining work-experience in general, and of gaining curriculum related work-experience in particular, would bear fruit. Try-Out Center students were compared with Comparison Center students for differences in the proportions of total enrollment that actually obtained pre-graduation employment. Further, employed Try-Out

students were compared with employed Comparison Center students for the extent to which the groups differed in their rate of curriculum related pre-graduation employment.

(3) Finally, Try-Out Centers were expected to provide conditions and opportunities affecting the total group's entry into post-high school employment. Try-Out and Comparison Center students were followed up to identify the comparative extent to which these groups embarked upon curriculum-related adult employment or curriculum-related higher education.

b. Actual participation in directed work-experience by Try-Out Center students was expected to contribute notably to three important educational objectives:

(1) The attainment of a superior level of achievement in technical knowledge and competence compared to students in more conventional programs.

(2) The expression of a higher level of job satisfaction than employed Comparison Center students on a measure of attitudes expressed toward work.

(3) The achievement of a higher post-graduation success rate than Comparison Center students in terms of the rate of full-time employment in curriculum-related jobs, and in terms of the rate of enrollment in advanced educational programs related to the high school vocational curriculum.

Achievement in Technical Knowledge and Competence

In order to assess the impact of work-experience on vocational students' acquisition of technical, occupationally relevant knowledge, multiple choice achievement tests were constructed for the subject areas of ornamental horticulture and agricultural mechanization. Because of the diversity of distinct specialties within ornamental horticulture and because of a corresponding heterogeneity of curricular content and emphasis from school to school, the ornamental horticulture test was divided on a content-basis into seven subtests. To adapt the test to the curricular experiences of students in different schools, these sub-tests were administered selectively to the students at ornamental horticulture Try-Out and Comparison Centers. The relative uniformity of agricultural mechanization curricula, on the other hand, permitted the construction of a single instrument for administration to all students at agricultural mechanization Try-Out and Comparison Centers.

Item Selection:

Test items are multiple choice items with four options per item. They were constructed or selected from a broad collection of resources including: teacher course outlines and lesson plans, teacher constructed tests, New York State Regents Examination, high school texts, trade and technical manuals, and consultation with generalists and specialists in

vocational agricultural education. The content validity of items was reviewed by experienced teachers of agriculture and some modifications were introduced at their suggestion. Subsequent to the item analyses described below, the revised measures were submitted to the teacher-coordinators of directed work-experience programs for an evaluation of the tests' conformity with curricular content.

Administration, Item Analysis, and Scoring:

After a limited field trial to insure the adequacy of directions and the appropriateness of administrative procedures, the tests were administered to the senior students of ornamental horticulture or agricultural mechanization at the Try-Out and Comparison Centers. In all cases, the tests were administered less than one month from the close of the school year. Item analyses were conducted to identify the items on each test that: exhibited appropriate difficulty indices, contributed positively to discrimination between high and low scorers, measured a relatively homogeneous criterion of achievement success, and contributed to optimizing the Index of Test Reliability. Students' achievement scores were computed only from their responses to items that met these criteria. This was accomplished by assigning unit weight to each item meeting the criteria and assigning zero weight to defective items. Finally, the students' raw scores were converted to percentage scores. On the agricultural mechanization test, since all students responded to all items, these scores were computed as a percentage of all unit-weighted items. Since the subtests of the ornamental horticulture test were administered selectively on the basis of student exposure to content, these scores were computed as a percentage of those unit-weighted items administered to the individual student.

Data Analysis:

Prior to investigating the differences between Try-Out and Comparison Center students on achievement test performance, preliminary analyses were conducted on the test-score distributions of the Try-Out Center students. An analysis of variance for the difference between percentage-score means and Bartlett's Test for homogeneity of variance were used to compare central tendency and dispersion characteristics of the agricultural mechanization and ornamental horticulture groups on their respective achievement tests. The purpose was to determine if the percentage score performance of students in these two groups might legitimately be pooled under the broader rubric of achievement in directed work-experience programs. The research objective of evaluating the contribution of experience programs to technical competence, regardless of specific curricular content, would manifestly be served to greater advantage by pooling achievement data, than by conducting separate analyses for each course of study. The pooling of the data, if justified, would result in a more parsimonious and efficient utilization of data. More importantly, it would enhance the generalizability of the results of statistical analysis.

The significance of the contribution of the directed work-experience program to differential achievement was tested at the .05 level. Try-Out

Center participants in directed work-experience and Comparison Center students were compared for mean differences in level of measured achievement. These achievement measures are reproduced in their entirety in APPENDIX B.

Attitude Toward Work

The Instrument

It is assumed that attitude toward work is partially conditioned by actual and anticipated contribution of work to goal attainment. The investigators believed that work-experience, emphatically structured to enhance and contribute to fostering the attainment of vocational aspirations would provide a source of satisfaction reflected in the students' expression of favorable attitudes toward their work. The Index of Job Satisfaction⁴⁹ was selected as the measurement device for use in assessing the validity of this expectation. This Index is an uncopyrighted instrument developed by Brayfield and Rothe to provide a general measure of a person's attitude toward his work. Published reports on research applications of the Index evidence satisfactory reliabilities, yielding corrected reliability of .90. A validation study yielded significant differentiation in the predicted direction at the .01 level between groups employed at jobs related to their occupational training and groups employed in jobs unrelated to their occupational training. Evidence also indicates that the items effectively sample expressed attitude over a broad range of intensity. The Index is reproduced in APPENDIX B.

Procedures and Analysis:

The Index of Job Satisfaction was administered to all Try-Out Center students actually participating in directed work-experience and to all employed Comparison Center students. The mean difference between group performances on the Index was tested for significance at the .05 level, holding constant the differential contribution of wages as a motivational source of satisfaction. Hypothesizing a difference attributable to the favorable effect of the directed work-experience program on attitude, the investigators expected Try-Out Center students to exhibit a more favorable mean attitude than Comparison Center students.

Post-Graduation Follow-Up: Employment Success

In order to relate the contribution of the directed work-experience program to some meaningful criterion associated with entry into adult employment, a survey of the employment status of Try-Out and Comparison Center students was conducted six months after graduation. The following determinations were made:

1. Is the student employed?
2. If employed, is the student working full-time or part-time?
3. If the student is employed, is the nature of his work directly related to the specific training objectives of his vocational education program?

5. Is the student, whether employed or not, continuing his formal education at the post-secondary level?
6. If engaged in the pursuit of higher education, is the student enrolled in a program related to his secondary vocational program?
7. If the student is neither employed nor enrolled in a program of advanced education, has he entered military service?

With this data, comparisons for differences were made between group proportions for Try-Out Center graduates and Comparison Center graduates on the early attainment of post-secondary objectives. The groups, minus those who have already begun to fulfill their military obligation, were compared for differences in overall rate of employment, rate of employment in curriculum-related occupation, rate of matriculation in any formal program of advanced study, and rate of matriculation in specifically agricultural programs of advanced study.

Admittedly, this data was collected an uncomfortably short time after graduation. A longer period of time prior to follow-up would have been preferable. And more extensive inquiry into post-graduation employment variables would have been desirable. Originally, in fact, more ambitious plans were formulated for follow-up evaluation. However, time restrictions and fiscal limitations imposed by the funding agency necessitated the acceptance of more modest evaluation objectives.

4. Evaluation Objective #3: Justification of Extent of Work:

An inquiry was conducted to determine if more or less directed work-experience contributes differentially to more or less favorable educational and occupational outcomes. The assumption of a direct linear relationship between the extent of work-experience and the benefits of work-experience is the fundamental rationale for establishing minimum work requirements. Try-Out Center students were divided into two groups, based upon the number of hours that students logged in directed work-experience. On each criterion students, for whom reliable criterion data were available, were grouped into "high" and "low" experience groups. The cut-off between "high" and "low" experience was the median number of hours spent in directed work-experience. Very conveniently the cut-off for all criteria were relatively similar in magnitude. Moreover, the mean number of hours worked by both the "high" and the "low" experience groups on each criterion approximated optima suggested in various quarters. This facilitated an evaluation of the need for experience requirements as such and of the effects of the extent of work-experience. High and low experience groups were compared for the statistical significance of group differences at the .05 level on the following criteria: achievement, as measured by the tests developed in the two subject matter areas; attitude toward work, as measured by the Brayfield-Rothe Index of Job Satisfaction; employer ratings of student performance on the job; and rate of entry into curriculum-related employment or post-graduate educational programs.

a. Try-Out Center students who participated in directed work-experience were compared for mean differences in measured achievement as a function of the extent and duration of work-experience.

To control for the contribution of ability to mean differences, achievement test performance of "high" and "low" experience groups were subjected to analysis of covariance, using subtests of the General Aptitude Test Battery as covariance controls.

Early in the try-out phase of the project the G.A.T.B., a battery of occupationally relevant ability measures, had been administered to Try-Out Center participants under agreements with State Employment Services and State Bureaus of Employment Security. To identify the G.A.T.B. subtests relevant to achievement test performance, achievement test data were first regressed via step-wise multiple regression on the complete set of G.A.T.B. subtest scores. Those G.A.T.B. subtests that explained substantial portions of achievement test variance were used as covariance controls in the analyses of covariance. The analysis of covariance, then, was used to test for significant mean differences between "high" and "low" experience groups after adjustment to remove differences attributable to measured ability. This adjustment for between-group differences in ability protects conclusions suggested by the analysis of variance from spuriously attributing to program differences results that are more probably attributable to aptitude differences.

b. The "high" and "low" experience groups were subjected to differential comparison on their mean levels of expressed attitude toward work, as measured by the Index of Job Satisfaction. Again, analysis of covariance using G.A.T.B. subtest scores as covariates was performed after identifying via step-wise multiple regression the aptitude measures that contribute most to explaining variation in measured attitude.

c. Similarly, the ratings assigned to students by employers on a Work Rating Scale were tested, using analysis of covariance for the significance of the adjusted mean difference between groups. Again, step-wise multiple regression was used first to identify the G.A.T.B. subtests that contribute most to explaining criterion variance. And again, those subtests served as sources for the covariance adjustment of criterion means.

d. Finally, the "high" and "low" experience groups were subjected to tests for the significance of the difference between proportions on two follow-up criteria: the proportion of students in each group that entered upon curriculum-related employment during the follow-up period and the proportion of students in each group that entered upon curriculum-related programs of post-secondary education during the follow-up period.

With the exception of the Work Rating Scale, the criterion measures used in evaluating the effects of the extent and duration of work-experience have been discussed at length in previous sections of this report. The Work Rating Scale was constructed as a measure of job performance. It is a nineteen-item instrument on which employers and work supervisors

judge the quality of student performance over a wide range of worker traits. Item selection was based on the consistent agreement observed among teachers, prospective employers, and the project's panel of consulting experts in identifying the factors that contribute to job success. The item content is diverse, ranging from dependability and initiative to courtesy and personal appearance. APPENDIX B.

Admittedly the Work Rating Scale is a record of personal impressions. A worker's employability and continued employment, however, depend largely upon the personal impressions and judgments of his superiors. It is appropriate and desirable, therefore, to evaluate the success of a student's job placement, at least partially, in terms of employer judgments.

To justify a claim to content validity, the instrument need reasonably purport only to take the measure of a worker's fulfillment of his employer's expectations for employee performance and behavior. The similarity of item content with the expectations expressed by prospective employers⁵⁰ does, indeed, attest to the relevance of the Work Rating Scale's items. In addition, teacher coordinators concurred in their acceptance of the relevance and appropriateness of item-content at intensive evaluation sessions held at Cornell University, both before and after the project's try-out phase.

Statistical inquiry into the characteristics of the instrument indicate high reliability of the internal consistency type, offering strong evidence for the homogeneity of the construct measured. Work ratings for the total sample of students who participated in directed work-experience yielded a Spearman-Brown reliability (based on the average item-test correlation⁵¹) of .95. Step-wise multiple regression of total scores on the complete set of item responses yielded, moreover, a multiple correlation coefficient of .90. Roughly 80% of the variance in the total-score distribution explained by the items was concentrated in five items. These five items, upon close examination, do appear to represent the broad areas of an evaluative domain (quality of job performance) under which most other items might be subsumed. Essentially these five items survey:

1. The impact of on-the-job instruction upon the quality of work.
2. Courtesy and cooperativeness.
3. Attentiveness to directions.
4. Punctuality and dependability.
5. Student awareness of his limitations.

On each item of the instrument, the rater evaluates the worker's performance level on a five-point scale along a continuum from "excellent" to "unsatisfactory". Ratings of excellence received item scores of 5; unsatisfactory performance received an item score of 1; and intermediate ratings received weights of 4, 3, and 2. The total job performance score on the Work Rating Scale is a simple sum of item scores.

IV. FINDINGS AND RESULTS

A. Evaluation of Guidelines and Procedures:

The operational success of the guidelines and procedures was explored through the application of Thurstone's Judgment Scaling Models to a series of forced-choice evaluative judgments by teachers, students, and employers. The quantitative results of the scaling analyses, reporting specific scale values derived for individual guidelines, are summarized in the tables of APPENDIX C, Section I. A description of the scaling analysis procedures is reported in Section II of APPENDIX C.

In general, the scaling analyses indicate that each group of respondents -- teacher-coordinators, student participants, and affiliated employers -- rendered group judgments supporting the functional importance of the guideline directives. Each group endorsed, in a majority sense at least, each guideline that defines a specific group function, responsibility, or objective. In most instances the agreement expressed represented very substantial majorities. It was not unusual, moreover, to find near unanimity of judgment about the functional importance that teachers, students, or employers attached to individual guidelines. Occasionally, in fact, complete unanimity was observed. The effect of these response patterns upon the results of the scaling analyses was to locate all guideline items within the positive, favorable range on a bi-polar judgmental continuum of importance. None of the guideline content evaluated by any group was classified as unimportant with sufficient frequency to locate it in the unimportant range on the bi-polar scales. Cumulatively, these results represent widespread and decisive endorsement of the solid core and substance of the Guidelines and Procedures by all three groups. Generally speaking, respondents who have had first-hand experience in the implementation of the Guidelines and Procedures assign them a place of importance as determinants of success in the vocational preparation of students.

The scale analyses also result in the assignment of values indicating the relative importance attached by group judgment to each item. From the response patterns for each of the participant groups surveyed, the guideline items arranged themselves by level of importance into three noticeably distinct classifications. These levels may be taken, moreover, to represent the relative priority levels that group judgment assigns to the items, since respondents have, generally speaking, affirmed through independent judgments the categorical importance of all the items.

1. Teacher-Coordination:

Teachers with experience in implementing the Guidelines and Procedures attach special importance to several items. High priority items receiving the most emphatic teacher support include:

a. Employing supervised work-experience as a context for encouraging the development and improvement of work habits⁵² and as a training

ground for the development of specific, marketable skills.⁵²

b. Placing students for work-experience in commercial, out-of-school settings⁵³ that provide real job experience closely related to the student's course of study.

c. Facilitating coordination of the in-school and out-of-school aspects of the program through frequent teacher visits to job locations.⁵⁴

d. Protecting the interests of all involved persons through a formal agreement that specifies the conditions of the student's employment.⁵⁵

In addition, teachers also place a high priority upon:

e. The establishment of a clear pre-placement policy. This includes identifying, with the help of an advisory board of employers, competencies the school should foster in preparing students for job placement.⁵⁶ It also includes the attainment of accord between teacher and employer regarding the kind of experiences the employer will undertake to provide for students.⁵⁷

f. Preservation of employer autonomy, affirming the employer's prerogative to interview and select for work-experience the student-applicant of his choice.⁵⁸

g. Entrusting to the employer the responsibility for providing the student-worker with appropriate job orientation⁵⁹, and imposing upon the school responsibility for integrating into the course of study a general orientation to employment and vocational information.⁶⁰

h. Arrangement of class schedules to ensure student opportunity to participate in directed work-experience.⁶¹

i. Systematic evaluation of program progress and development, solicited principally from students and employers.⁶²

There is an intermediate group of guidelines that do not evoke from the teachers the same striking levels of positive response and unanimity of acceptance that characterize the preceding items. Nonetheless, they do command strong support from a clear and substantial majority of teachers experienced in their use. These items include:

j. Engaging the active support and involvement of various groups in the planning and operation of the program: school administration⁶³, guidance personnel⁶⁴, parents⁶⁵, the business community⁶⁶, and an advisory board composed principally of employers.⁶⁷

k. Using services of the advisory board of employers to develop and improve the vocational course of study⁶⁸, to evaluate placement opportunities⁶⁹, and to counsel the teacher in his negotiations with employers.⁷⁰

l. Accommodating the course of study to the demands of work by coordinating content and sequence of instruction with job requirements⁷¹, by individualizing safety instruction⁷², and by affording students an opportunity to discuss in school the problems encountered at work.⁷³

m. Ensuring the equitable remuneration of student-participants for services rendered to an employer.⁷⁴

n. Arranging for work-experience of sufficient duration to realize the objective of learning a job.⁷⁵

o. Conducting periodic follow-up studies of students' post-high school performance to evaluate the program's effectiveness and to identify appropriate modifications.⁷⁶

p. Keeping the school administration informed concerning the progress and accomplishments of the program.⁷⁷

Finally, there were a number of items whose functional importance the majority of teachers tended to accept, but which they consistently consigned to a relatively low position in the guideline hierarchy. These include:

q. Items dealing with the performance of public relations functions and the use of communications media to publicize the vocational program in the school and community.⁷⁸

r. Serious consideration of employer evaluations of student progress at work.⁷⁹

s. The granting of additional credit toward graduation for the successful completion of a work-experience requirement.⁸⁰

t. The utilization of vocational testing and counseling services available from State Employment Bureaus.⁸¹

u. The restriction of participation in work-experience to students whose vocational objectives coincide closely with the kind of placement opportunities available in the program.⁸²

2. Student Participants in Directed Work-Experience:

Student evaluation of the guidelines consistently assigns the highest level of priority to items most immediately related to the student's personal experience in the classroom and at work. The greatest importance is attached to:

a. Obtaining placement for work-experience through the normal hiring process of application and interview.⁸³

b. Early and thorough orientation of the student to his duties by the employer.⁸⁴

c. The school's responsibility for equipping the student with the specific skills required in his work⁸⁵ and with an adequate knowledge of the safety precautions specific to his job.⁸⁶

d. Providing students with an opportunity to discuss and resolve in the classroom the day-to-day problems encountered at work.⁸⁷

e. The contribution of the program to the clarification of occupational choice⁸⁸ and to specialized preparation for a particular job.⁸⁹

f. The exercise of active employer influence over the content of the vocational course of study.⁹⁰

Student judgment tends to cluster several items at an intermediate priority level. Though still decisive, group support of these guidelines is both less intense and somewhat less consistent than its response to high priority items.

Included in this group of guidelines are:

g. Provision for work-experience of extended duration⁹¹ with the opportunity to develop a variety of job skills.⁹²

h. The payment of regular wages to student-workers.⁹³

i. The selective admission of students to the vocational program⁹⁴, and the arrangement of class schedules in a manner that facilitates participation in work-experience.⁹⁵

j. Active promotion of the interest, support and cooperation of parents and of the community at large.⁹⁶

k. Attentiveness to student progress through practices like teacher visits to students at work⁹⁷, employer evaluation of student progress⁹⁸, and the maintenance of a personal employment record by students.⁹⁹

Comparatively speaking, students show the least concern over two items. They assign a relatively low priority to obtaining extra credit toward graduation for the fulfillment of a work-experience requirement.¹⁰⁰ And they appear far less interested in efforts to bring the program to the attention of others than they are in their own personal relationship to the program.¹⁰¹ Nonetheless, even these items command the approval of a substantial student majority, despite their relatively low status in the students' evaluative hierarchy.

3. Employers:

Employers who hired students in conjunction with directed work-experience programs were united in an unqualified endorsement of the importance of the guidelines as a whole. So extensive was their support of the preponderant majority of individual guidelines that it becomes difficult to establish an order of priority among them through scaling analysis. However,

it appears that employers placed the highest priority upon guidelines of two broad types: items concerned with the preliminary processes that immediately precede the hiring of students and items that stress the developmental aspects of work-experience. Included among these high priority items are:

a. Reserving to the employer, after interviewing the student, the final decision about hiring him for work-experience.¹⁰²

b. The thorough orientation of the student to the duties of his position before initiating work-experience.¹⁰³

c. The establishment prior to student placement of an understanding between teacher and employer concerning the employer's supervisory responsibilities.¹⁰⁴

d. The assignment of the student to tasks that enable him to develop and practice useful occupational skills.¹⁰⁵

e. Emphasis upon development and improvement of the habits of work proper to the student's job.¹⁰⁶

f. Providing work-experience of sufficient duration for the student to learn to perform a variety of useful job tasks.¹⁰⁷

Generally speaking, guidelines assigned to an intermediate level of priority by employer judgment are those commanding the support of a very substantial majority of employers with a degree of intensity that falls somewhat short of the approval reserved to high priority items. Acceptance and support of these guidelines by the employer group is, therefore, both strong and decisive. Falling within this group of items are:

g. A description of the functions of the teacher's advisory board¹⁰⁸, which is composed principally of employers:

(1) Helping to plan the work-experience program's procedures and policies.

(2) Contributing ideas for the development and improvement of the school's vocational courses.

(3) Helping teachers identify those student qualifications that represent readiness for job placement.

(4) Advising the teacher about the appropriateness of potential placement opportunities.

h. Provision of specialized training in directed work-experience, developing the skills required for a particular job.¹⁰⁹

i. The payment of regular wages to students engaged in directed work-experience.¹¹⁰

j. The assignment of responsibility to the school for instructing the student in all necessary safety precautions prior to placement.¹¹¹

k. A formal agreement between student, employer, parents, and teacher specifying prior to student placement the terms of employment.¹¹²

l. The frequent visitation of student and employer at the place of work by the teacher.¹¹³

Finally, the employer group assigned to a small number of items a relatively low priority. Because a clear majority affirmed the categorical importance of even these items, it is necessary to caution against interpreting a comparatively low priority level as evidence of unimportance. These guidelines do command employer approval; they are merely located near the lower end of the employers' positive preferential hierarchy. In this group of guidelines employer judgment placed:

m. Employer responsibility for providing the school with reports on student performance and progress at work.¹¹⁴

n. The advisory board functions of counseling the teacher on matters of public relations¹¹⁵ and of assisting the teacher to evaluate program effectiveness.¹¹⁶

o. The establishment of the advisory board.¹¹⁷ Note that employers have assigned to the establishment of an advisory board a lower priority than they have assigned to several advisory board functions. This apparent inconsistency, however, need not cause alarm. It is probably attributable to employers' concurrence with specific advisory functions, to which they did not advert in evaluating the advisory board's establishment.

B. The Effectiveness of Directed Work-Experience with Respect to Selected Criteria:

1. The Effects of Affording Students an Opportunity to Engage in Directed Work-Experience:

a. Evidence did not support a hypothesis favoring a higher rate of student retention in school for programs offering directed work-experience as part of the course of study. Try-Out Centers, promoting directed work-experience, achieved 91 percent retention (i.e., nine percent drop-out rate) among seniors enrolled in the program. Comparison Centers, conducting conventionally organized programs of instruction, retained 92 percent of their senior enrollments through graduation. Clearly, neither statistical nor practical significance may be attached to the minute difference observed in the holding power of the two types of programs. The smallness of the difference, in fact, made it quite unnecessary to conduct a statistical test for the significance of the difference. TABLE 2 reports the holding power of the directed work-experience programs and of conventional programs for each area of subject specialization studied and for both areas together.

TABLE 2: Percent of Senior Students of Vocational Agriculture Who Completed the 1966-1967 School Year

Program	Subject Area		
	Ornamental Horticulture	Agricultural Mechanization	Both Subjects Combined
Directed Work-Experience	90	92	91
Conventional	89	93	92

b. Hypotheses that the Try-Out and Comparison Centers would exhibit differential rates of pre-graduation employment experience among their senior students were emphatically confirmed. In the Try-Out Centers, which stressed and actively fostered the attainment of curriculum-related employment experience, a significantly larger number of students obtained paid employment in commercial settings. Further, of those who obtained employment, Try-Out Center students obtained positions related to the curriculum and to their vocational aspirations with significantly greater frequency than Comparison Center students.

TABLE 3 reports by area of subject specialization the frequencies and percentages of students enrolled in directed work-experience programs and in conventional programs who obtained pre-graduation employment experience. TABLE 4 reports the frequencies and percentages of employed students whose employment was related to their course of study and vocational aspirations. The two tables also report the values of the critical ratios in tests of the significance of differences between the observed employment rates of Try-Out Center students and Comparison Center students. The statistical hypotheses of no differences between groups were tested for significance at the .05 level.

TABLE 3: Senior Students of Vocational Agriculture at Try-Out Centers (N=167) and Comparison Centers (N=139) Who Obtained Pre-Graduation Employment Experience

Program	Subject Area						
	Ornamental Horticulture		Agricultural Mechanization		Both Subjects Combined		CR
	f	%	f	%	f	%	
Directed Work-Experience	94	90.3	56	88.8	150	89.8	5.79
Conventional	34	52.3	53	71.6	87	62.6	

The value of the critical ratio statistic, 5.79, obtained for the difference between the pre-graduation employment rates of the total enrollments of Try-Out and Comparison Center programs is significant at and beyond the established .05 level. A difference this large or larger would, in fact, be expected to occur by chance alone less than one in ten thousand times.

The effectiveness, therefore, of the directed work-experience program for encouraging greater numbers to obtain remunerated employment experience

in commercial settings prior to graduation from high school is accepted.

TABLE 4: Employed Senior Students of Vocational Agriculture at Try-Out Centers (N=150) and Comparison Centers (N=87) Whose Pre-Graduation Employment Was in Their Area of Subject Specialization

Program	Subject Area						
	Ornamental Horticulture		Agricultural Mechanization		Both Subjects Combined		CR
	f	%	f	%	f	%	
Directed Work-Experience	68	72.3	39	69.6	107	71.3	6.95
Conventional	9	26.4	15	28.3	24	27.5	

The rate at which working Try-Out Center students found employment in curriculum-related jobs prior to graduation differed significantly at and beyond the .05 level from the rate observed for employed Comparison Center students. A critical ratio as large or larger than the observed value would be expected to occur by chance alone less than one time in 10,000. The null hypothesis of no difference is therefore rejected; and the effectiveness of the directed work-experience program for encouraging the acquisition of experience relevant to the course of study and student aspirations is accepted.

c. Six months after graduation an inquiry was conducted to determine the occupational/educational status of the June graduates from the Try-Out Center programs offering directed work-experience opportunities and from the conventional programs offered in Comparison Centers. It was discovered that larger numbers of Try-Out Center students acquired full-time employment directly related to their vocational course of study. Furthermore, the Try-Out Center students entered upon curriculum-related degree programs (A.S. or B.S.) with greater frequency than did Comparison Center students. In both instances the observed percentage of Try-Out Center students exceeded the observed percentage of Comparison Center students at the .05 level of significance. The null hypothesis of no group differences is rejected; and the investigators' directional alternative hypothesis favoring Try-Out Center students is accepted. TABLE 5 summarizes the post-graduation status of Try-Out Center and Comparison Center students according to occupational/educational classification six months after graduation. Also tabled are the critical ratio values (C.R.) for the significance of the percentage difference between groups in those two categories for which a priori hypotheses were specified.

TABLE 5 incorporates complementary data that helps to place in perspective the results of testing the hypotheses about entry into curriculum-related employment and higher education. Not only did a smaller percentage of Comparison Center students enter upon employment in the field for which they were prepared; a very large percentage of them actually took employment in other fields. Try-Out Center students, on the other hand, showed a much higher incidence of entry into military service and less inclination to take civilian employment in fields unrelated to their vocational preparation.

TABLE 5: Current Occupational Status of 1966-1967 Senior Students Enrolled in Specialized Vocational Agriculture Courses at Try-Out Centers (N=149) and Comparison Centers (N=121)

Program	Curriculum Related				Other Fields		
	Employment		Degree Program		Employment	Degree Program	Military Service
	%	CR	%	CR	%	%	%
Try-Out	25.5	2.83	20.1	1.90	18.1	7.3	24.8
Comparison	12.4		11.5		54.5	9.0	5.7

2. The Effects of Actual Participation in Directed Work-Experience by Try-Out Center Students:

a. Achievement in Technical Knowledge and Competence:

The preliminary analysis of variance comparing the percentage-score achievement test means of student-mechanics and student-horticulturists on their respective achievement tests yielded non-significant results at the .05 level. The analysis of variance table for this comparison is given in TABLE 6.

TABLE 6: Analysis of Variance: Percentage-Score Achievement Test Distributions for Participants in Directed Work-Experience, Students of Ornamental Horticulture (N=68) vs. Students of Agricultural Mechanization (N=35)

Source of Variance	Degrees Freedom	Sum of Squares	Mean Square	F
Between Groups	1	670.6	670.6	3.11
Within Groups	101	21719.7	215.0	
Total	102	22390.4		

The observed value of F, 3.11, has a probability of occurring by chance alone more than five times in a hundred. The result, therefore, is failure to reject the null hypothesis of no difference between groups. Moreover, Bartlett's Test for homogeneity of variance yields a Chi-Square value of 1.136 with one degree of freedom. This value is also non-significant at the .05 level, resulting in failure to reject the null hypothesis of no differences between the variances of the percentage score distributions. Recall that these analyses are based upon different instruments administered to independent sub-groups of a single treatment (directed work-experience) population.

Because of the presumed equivalence of their central tendency and dispersion parameters, these highly specific measures of technological

achievement may be treated as roughly equivalent measures of the technical proficiency, in a generic sense, exhibited by groups representing these technologies in the population. Pooling the percentage-score achievement test results of agricultural mechanization students and ornamental horticulture students engaged in directed work-experience for comparison with other groups appears, therefore, justified.

The analysis of variance comparing the pooled percentage-score achievement distribution of Try-Out Center students with the pooled percentage-score achievement of Comparison Center students yields an F-ratio that is significant at and beyond the .05 level. The null hypothesis of no difference in the level of technical competence attained by students of directed work-experience programs and of conventional programs is rejected. The directional research hypothesis favoring superior test performance attributable to participation in the directed work-experience program by Try-Out Center students, is accepted. The analysis of variance table (TABLE 7) for this comparison is reproduced below:

TABLE 7: Analysis of Variance: Percentage-Score Distributions for Participants in Directed Work-Experience (N=97)* vs. Comparison Center Students (N=97)*

<u>Source of Variance</u>	<u>Degrees Freedom</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>
Between Groups	1	2218.2	2218.2	10.36
Within Groups	192	41092.4	214.0	-
Total	193	43310.6	-	-

* Sample sizes for this comparison were determined by the availability of achievement test data on Comparison Center students. Teachers found it possible to administer the tests to 118 students from a total enrollment of 139. Of this number, 21 subjects were disqualified because of unscorable papers, inadequate identification, or absence of collateral data. In order to equalize sample sizes, six of the 103 directed work-experience participants were eliminated from the analysis by random selection.

The observed percentage-score means for participants in directed work-experience programs and Comparison Centers were 54 and 47 respectively. Their respective variance estimates were 222.7 and 205.3.

The observed value of F, 10.36, at 1 and 192 degrees of freedom is significant at and beyond the .05 level. In fact, the probability of obtaining an F-value this large as a function of chance is less than .005.

b. Attitude Toward Work - Index of Job Satisfaction:

Analysis of variance was used to test, at the .05 level, the mean attitudinal difference between directed work-experience participants and

employed students of conventional programs, utilizing wages earned during the try-out period as a covariance control. This analysis yielded an F-ratio that failed to reach the specified level of significance.

The means and standard deviations for group response to the Index of Job Satisfaction are given in TABLE 8. The analysis of covariance table for the between groups comparison follows in TABLE 9.

TABLE 8: Attitude toward Work as Measured by the Brayfield-Rothe Index of Job Satisfaction

<u>Employed Groups</u>	<u>Mean</u>	<u>S.D.</u>	<u>N*</u>
Try-Out	64.02	11.27	99
Comparison	62.74	12.70	62
Combined	63.52	11.84	161

* Sample sizes represent the number of subjects in each group who were employed and for whom an adequate estimate of wages was available.

Note that the mean attitude level expressed by both groups may be interpreted as no more than a moderately favorable response. Means of this magnitude lie about midway between a firmly favorable level of response and neutrality. Nonetheless, it should also be noted that the observed means of both groups far exceed values characteristic of unfavorable response. Consequently students in both groups are far more satisfied than dissatisfied, even though their level of satisfaction falls short of unqualified enthusiasm.

TABLE 9: Analysis of Covariance Table - Attitude Toward Work Reported on the Index of Job Satisfaction by Participants in Directed Work-Experience and Students in Conventional Vocational Programs.

<u>Source of Variance</u>	<u>Degrees Freedom</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>
Between Groups	1	61.94	61.94	.44
Within Groups	158	22305.84	141.18	
Total	159	22367.78	-	

The discovery of an F-value substantially smaller than 1.00 suggested the possibility of some non-chance factor operating to minimize the difference between means, inducing an unexpectedly high level of concurrence in the mean attitudinal responses of the two groups. However, the observed value of F, .44, was found to exceed the F-value that cuts off the lower

five percent region of the F-distribution at 159 and 1 degrees of freedom. The conclusion remains simply, therefore, that there appears to be no difference attributable to program differences between the groups' mean attitude levels.

c. Post-Graduation Follow-Up: Occupational and Educational Status:

The follow-up survey conducted six months after high school commencement, indicated that graduates from Try-Out Centers who participated in directed work-experience as seniors found employment in their field of vocational preparation with greater frequency than Comparison Center students. In addition, the participants in programs of directed work-experience evidenced a higher incidence of entry into curriculum-related degree programs (A.S. or B.S.) at institutions of higher education than did Comparison Center students. In both cases a test for the significance of the difference between group proportions yields critical ratios significant at and beyond the .05 level, the level set for the rejection of the null hypothesis.

The directional alternative hypothesis favoring for participants in directed work-experience a higher rate of entry into pursuits related to high school training is confirmed.

TABLE 10 summarizes the current employment and educational status of Try-Out Center graduates who participated in directed work-experience and Comparison Center graduates; also reported in TABLE 10 are the critical ratio values (C.R.) for tests of differences between group proportions in follow-up categories for which a priori hypotheses were formulated.

TABLE 10: Post Graduation Occupational and Educational Status (December, 1967) of Try-Out Center Participants in Directed Work-Experience (N=105) and Comparison Center Students (N=121).

Program	Curriculum-Related		Non-Agricultural Fields		
	Employ-	Higher	Employ-	Military	Higher
	ment	Education	ment	Service	Education
	%	C.R.	%	%	%
Directed Work-Experience	31.4	24.8	15.2	19.0	6.7
		3.45			2.59
Comparison	12.4	11.6	54.5	5.8	9.0

The small percentage of students in each group that remain unaccounted for by TABLE 10 were still enrolled in the secondary school's vocational program at the time of the follow-up survey.

C. Justification of Extent of Work:

1. Achievement in Technical Knowledge and Competence:

a. The stepwise multiple regression of achievement test performance on the twelve subtests of the General Aptitude Test Battery identified for participants in directed work-experience, two G.A.T.B. variables appropriate for use as covariates in the analysis of covariance. These two variables, Vocabulary (Subtest No. 4) and Computation (Subtest No. 2) were correlated .35 and .30 respectively with the achievement criterion and .28 with one another. The multiple regression of the achievement test on these two variables yields a multiple correlation coefficient of .40, accounting for some 16 percent of the variance in the achievement test distribution. No other G.A.T.B. subtests increased the multiple correlation coefficient by more than .01.

These two aptitude variables represent, by their content, the two greatest single contributors to general academic performance, verbal and quantitative ability. The contribution of these aptitude variables to group differences in measured technical achievement may be considered an artifact of academic ability and achievement. As such, it represents a spurious source of variation affecting the differences observed on the measure of technical achievement. Therefore, comparing residual differences in technical achievement, adjusted for the differences specifically attributable to scholastic aptitude, represents a more rigorous test of the hypothesis.

b. For the comparison of the achievement levels attained by two groups of Try-Out Center students who differed in the amount of work-experience they obtained, there were 99 students from the total of 103 participants in directed work-experience for whom achievement test scores, G.A.T.B. scores, and adequate work records were available. This group was divided at the median number of hours worked, 460 hours, into a "high" work-experience group and a "low" work-experience group. The range of hours worked by the "low" experience group was 45 to 450 hours with a group mean of 215 hours. The amount of work-experience logged by members of the "high" experience group ranged from 472 to 1284 hours with a group mean of 883 hours. As anticipated, an analysis of covariance for the mean difference in achievement, holding constant the contribution of verbal and computational ability, does not yield a significant F-value at the .05 level. There appears to be no contribution to achievement level attributable to differences in the extent of work-experience obtained by Try-Out Center students. TABLES 11 and 12 report results of the statistical analysis.

TABLE 11: Achievement Test Performance of High and Low Work-Experience Groups of Try-Out Center Students.

<u>Group</u>	<u>N</u>	<u>Means</u>	<u>S.D.</u>
High Experience (460 hours +)	50	53.90	-
Low Experience (-460 hours)	49	55.33	-
Combined Groups	99	54.61	14.43

TABLE 12: Analysis of Covariance: Mean difference in Achievement between "High" and "Low" Work-Experience Groups in Try-Out Centers (Covariance Adjustment for Verbal and Computational Ability)

<u>Source of Variance</u>	<u>Degrees Freedom</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>
Between Groups	1	16.40	16.40	.09
Within Groups	95	16953.22	178.45	-
Totals	96	16969.62	-	-

The group means, after covariance adjustment for the effects of aptitude upon achievement test performance were 54.61 and 55.02 for the "low" and "high" experience groups respectively.

A value of F as large or larger than the observed value, .09, may be expected to occur more than five times in 100 by chance alone, and we may not, therefore, reject the null hypothesis of no difference in the mean achievement of the "high" and "low" work-experience groups. Again, the observed value of F, in fact, falls substantially below 1.00, the theoretical expectation for F when only chance factors affect the difference. Again, therefore, question arose concerning the possible operation of non-chance factors to minimize group differences. However, it was discovered that an F value of .09 exceeds the value of F that cuts off the lower five percent region of the F-distribution at 95 and 1 degrees of freedom. Therefore, the conclusion remains merely that there is no difference between the group means that cannot be attributed to chance.

2. Attitude Toward Work: Index of Job Satisfaction:

a. Stepwise multiple regression of the attitude measure on the twelve subtests of the General Aptitude Test Battery isolated two ability measures appropriate for use as covariates in testing the significance of mean attitudinal differences between "high" and "low" experience groups of Try-Out Center students. The aptitude variables identified for this purpose were two measures of dexterity: Disassembly (Subtest No. 12) and Placing (Subtest No. 9). These variables correlated -.49 and .16 respectively with the measure of Try-Out Center students' attitude toward work. They were correlated .13 with one another. The correlation coefficient obtained for attitude level multiple-regressed on these aptitude measures was .548, accounting for some 30 percent of the variance in the distribution of scores on the Index of Job Satisfaction. No other G.A.T.B. variables increased the squared multiple correlation (variance accounted for) by as much as five percent.

b. Of the 103 Try-Out Center students who participated in directed work-experience, adequate work records, G.A.T.B. scores, and scorable responses to the Index of Job Satisfaction were available for 87 students.

The median number of hours devoted to directed work-experience was 428. The amount of work performed by the 44 students in the "low" experience category ranged from 64 to 428 hours with a group mean of 225 hours. The 43 students in the "high" experience classification obtained work-experience with individual totals ranging from 450 to 1591 hours. The mean for the "high" experience group was 799 hours.

As hypothesized by the investigators, the analysis of covariance for difference in mean attitude expressed toward work, holding constant the contribution of the two performance measures of occupations aptitude, yields a non-significant F-value at the .05 level. Expressed attitude toward work does not appear to be a direct function of the differential levels of work-experience obtained by these students. The statistical results of this analysis are summarized in TABLES 13 and 14.

TABLE 13: Index of Job Satisfaction - Attitude Toward Work Expressed by High and Low Experience Groups of Try-Out Center Students

<u>Group</u>	<u>N</u>	<u>Means</u>	<u>S.D.</u>
High Experience (450 hours +)	43	63.67	-
Low Experience (-450 hours)	44	64.84	-
Combined Groups	87	64.26	11.21

TABLE 14: Analysis of Covariance - Mean Difference in Attitude Expressed Toward Work on the Index of Job Satisfaction by High and Low Experience Try-Out Center Students

<u>Source of Variance</u>	<u>Degrees Freedom</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>
Between Groups	1	243.90	243.90	2.83
Within Groups	83	7149.24	86.14	-
Total	84	7393.15	-	-

Group means, after covariance adjustment for the dependency of attitude on the two measures of performance aptitude, were 62.55 and 65.94 for the "low" and "high" experience groups respectively. The observed value of F, 2.83, has, at 1 and 83 degrees of freedom, a greater than five percent likelihood of occurrence by chance alone. The prospect of obtaining an F-value of this magnitude by chance is, in fact, about .10. The expectation of the investigators that evidence would fail to support the relevance of the time factor to the level of job satisfaction reported

by Try-Out Center students who participated in directed work-experience is supported.

3. Employer Evaluation of Student Work Performance -- Work Rating Scale:

a. Prior to comparing differences in performance ratings assigned to Try-Out Center students who obtained different amounts of directed work-experience, performance ratings were multiple-regressed on the twelve G.A.T.B. subtests. Stepwise multiple regression extracted two ability measures that appeared suitable for use as covariance controls in a test for differences between group mean-ratings. Assembly (Subtest No. 11) and Name Comparison (Subtest No. 1) taken together yielded a multiple correlation of .32 with the performance criterion, accounting for some 10 percent of its variance. These two measures represent very basic skills including the simple manipulation of small objects; concentration on simple, repetitive manual tasks, attention to minute details, and the recognition of similarities and discrepancies between visual cues.

The Assembly and Name Comparison measures are correlated .19 with one another, and they correlate .23 and -.17 respectively with the criterion of employer ratings.

b. There were a total of 85 student-participants in directed work-experience for whom sufficient and reliable G.A.T.B. scores, work-experience records, and on-job performance ratings were obtained. The median number of hours spent working under the supervision of employers affiliated with the program was 472 hours. The mean number of hours worked by the 43 students below the median was 252. The 42 students above the median had a mean of 874 hours of work-experience.

Contrary to expectations, the mean difference in the employer ratings assigned to these groups, adjusted for the contribution of the Assembly and Name Comparison measures, was significant at and beyond the .05 level. Employers assigned, in general, highly favorable ratings to both groups. However, students who devoted themselves more extensively to directed work-experience earned, on the whole, more favorable evaluation from their employers. TABLES 15 and 16 summarize the analysis of covariance for the differential comparison of "high" and "low" experience groups.

TABLE 15: Performance Ratings Assigned by Employers to Try-Out Center Students; Students Grouped by Extent of Employment Experience

<u>Group</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>
"High" Experience (472 hours +)	85.56	-	42
"Low" Experience (-472 hours)	78.07	-	43
Combined Groups	81.81	10.65	85

TABLE 16: Analysis of Covariance - Mean Difference in Work Performance Ratings of High and Low Experience Students. (Covariates: Assembly and Name Comparison Subtests of G.A.T.B.)

<u>Source of Variance</u>	<u>Degrees Freedom</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>
Between Groups	1	1216.28	1216.28	13.04
Within Groups	82	7651.23	93.31	-
Total	83	8867.51	-	-

The group means, after covariance adjustment, were 78.00 and 85.63 for "low" and "high" experience groups respectively on a scale with a maximum obtainable rating of 95.

The probability of finding the observed value of F, 13.04, given chance alone as the source of variation, is less than .05. The prospect of obtaining an F-value this large or larger by chance is, in fact, quite remote -- less than one in a thousand. The null hypothesis of no difference between groups on the performance ratings assigned by employers is, therefore, rejected. Employer estimates of the differential quality of student performance on the job does appear to be a function of the amount of time devoted to directed work-experience.

4. Post-Graduation Follow-Up: Occupational and Educational Status:

A comparison for differences in the current employment and educational status of students who engaged in different amounts of directed work-experience yields, as expected, non-significant results. A total of 103 participants in directed work-experience were rank-ordered according to the number of hours spent in directed work-experience and divided at the median into "high experience" and "low experience" groups. The median number of hours for the total group was 472. The mean for the low experience group was 215 hours; and the high experience group had a mean of 883 hours.

For the criterion of entry into employment related to the vocational course of study, a test for the significance of the difference between group proportions yielded a critical ratio of .918. For the criterion of matriculation in a degree program related to the students' vocational training, the significance test yielded a critical ratio of .40. Both values fall below the critical ratio required for significance in a test of the null hypothesis of no difference between group proportions at the .05 level.

TABLE 17 reports as group percentages the educational and occupational status of the high and low work-experience groups at the time of follow-up. The table also reports critical ratios for the group comparisons specified by a priori hypotheses.

TABLE 17: Current Occupational and Educational Status of High Experience (N=51) and Low Experience (N=52) Participants in Directed Work-Experience Programs.

Program	Program Related				Other		
	Employ-ment		Higher Education		Employ-ment	Higher Education	Military Service
	%	C.R.	%	C.R.	%	%	%
High Experience	35.2		23.5		9.8	7.8	15.6
		.918		.400			
Low Experience	26.9		26.9		21.1	1.9	23.0

Note that eight percent of students in the high experience group do not fall within classifications represented by TABLE 17. Six percent were still enrolled in the high school's vocational program, and two percent were unemployed.

V. CONCLUSIONS AND IMPLICATIONS

A. General:

The results observed in evaluating the Guidelines and Procedures attest to the successful attainment of the fundamental and major objective of the project. This aim was the development of a viable, defensible, and useful model for planning, establishing, and conducting a program of directed work-experience in off-farm agricultural occupations. In a year-long trial period participating students, teachers, and employers experienced the concomitants and the consequences of implementing the guideline directives within the framework of vocational courses in agricultural mechanization and ornamental horticulture at the secondary level. In retrospect all respondent groups testified decisively to the importance of directed work-experience as an integral aspect in the education of the vocational student. Furthermore, they supported extensively the functional relevance of the specific content of the basic model proposed in the Guidelines and Procedures. Proceeding as they do from the first hand experience of the persons most crucially affected in the process, these judgments represent a ratification of the practicability, the practicality, and the perceived effectiveness of the model's core and substance. In addition to the collective and subjective judgment of participants, evidence relating to educational and occupational outcomes supports the effectiveness of programs organized according to the Guidelines and Procedures.

Great differences exist between agricultural mechanization and ornamental horticulture in the content of their technologies, in the kind of skills and learning each requires, in the location of employment opportunities, in conditions surrounding employment, and in the work itself. Agreement among representatives of both subject areas in their evaluative judgments, therefore, lead the investigators to conclude to the general acceptability of directed work-experience and of the Guidelines and Procedures in the vocational education of students for off-farm agricultural occupations. Moreover, the equally impressive results achieved through directed work-experience in agricultural mechanization and ornamental horticulture programs with respect to educational and occupational outcomes warrant a confident expectation of similar effectiveness in programs preparing students for other off-farm agricultural occupations.

The investigators have limited their conclusions to vocational education for off-farm agricultural occupations, because the project was developed and conducted almost exclusively within that particular frame of reference. The Guidelines and Procedures were developed specifically for the benefit of teachers in these fields. Nonetheless, the differences that exist between these specialties, particularly between agricultural mechanization and ornamental horticulture, are probably much greater than the increasingly superficial similarities that bring the two fields together in the vocational agriculture department of the secondary school. And as a consequence, findings may well have significant implications for a much broader range of offerings throughout the field of secondary vocational

education. The acceptance and effectiveness of work-experience programs in such diverse contexts as ornamental horticulture and agricultural mechanization invites an expectation of favorable outcomes in other vocational areas as well. It is suggested that similar inquiry in other vocational fields would profitably serve two important and related ends:

1. It would help to define the limits of the generalizability of the Guidelines and Procedures;
2. It would effect a critical and empirical evaluation of the merits of directed work-experience and of the guidelines as a source of curricular innovation for individual vocational specialties.

B. The Guidelines and Procedures:

The cumulative effect of the evaluative judgments elicited from project participants unquestionably represents an overwhelming general endorsement of the Guidelines and Procedures as a whole. Despite their capacity to evoke in virtually every instance the allegiance of clear majorities of teachers, of students, and of employers, the guidelines lack neither precision nor point of view. They deal, moreover, with matters that concern the personal and conceivably conflicting interests of the respondents. This in itself attests to the guidelines' successful incorporation of such serious considerations as personal responsibilities and controvertible policies to the mutual satisfaction of diverse interests. On this account and because of the range of relevant issues dealt with by the Guidelines and Procedures, the investigators feel vindicated in proposing the guidelines as an essentially practical and adequate blueprint for successfully initiating and conducting programs of directed work-experience.

The results of exploring the priorities assigned by respondents to specific guidelines are intrinsically less susceptible to definitive conclusions than results pertaining to acceptance and rejection. The discriminations in judgment that are required in defining a guideline hierarchy become more minute and, therefore, less reliable. This is especially true, of course, in individual cases, but it is true also with regard to cumulative group judgments. It might be misleading, therefore, to generalize the observed preferential hierarchies beyond the samples surveyed. Even if specific priorities were generalizable, intensive scrutiny of rank order for its own sake could be quite misleading. In simply describing sample response patterns, caution is necessary to avoid equating the relatively low priority of an essentially important item with unimportance. Since all the guidelines command substantial support from teachers, students, and employers, concentration on specific priorities as such is warranted only when circumstances might require choosing among them as alternatives. Otherwise, even the least among them has a proper function to fulfill in the work-experience program.

The identification of priority patterns does, nonetheless, contribute quite substantially to evaluating the guidelines' potential as a framework

for goal-directed, productive cooperation among students, employers, and teachers. Priority patterns, as opposed to specific priorities, reflect the focus of group attention and effort in the approach to directed work-experience. It would be entirely unrealistic to expect of all three groups such unanimous consensus of motivation and interest as to effect complete and explicit agreement on priorities. The primary focus of the guidelines is, of course, the benefit of the student -- specifically his vocational development. Yet the guidelines, to facilitate this objective, must accommodate, if not actively promote, the combined interests of teachers and employers as well. Even competing interests of the student himself must be accommodated. This can be accomplished only if the guidelines define roles, responsibilities, and policies in a manner that enables each group to make its contribution to student development in the process of pursuing its own interests. The compatibility of the emphases actually expressed by students, employers, and teachers is striking. It implies a large measure of success in accommodating the administrative and operational structure of a directed work-experience program to the satisfaction of diverse interests. Moreover, the avoidance of conflict of interests, as the content of the guidelines testify, has clearly been accomplished without sacrificing the principal aim and primary focus of directed work-experience -- the vocational development of the student.

It seems a safe and warranted conclusion, borne out by the evidence at hand, that the Guidelines and Procedures outline a program for supervised work-experience in off-farm agricultural occupations that is capable of eliciting widely the interest, support, and cooperation of the agricultural business community, of students of vocational agriculture and of vocational agriculture teachers. As a function of this capability, the Guidelines and Procedures represent a very real contribution to program development. The greatest value of the contribution lies in the manner in which it was accomplished -- abandonment of armchair speculation for the reality of empirical trial and critical scrutiny of practical experience.

C. The Effectiveness of Directed Work-Experience:

Inquiry into the criterion performance of students supports the contribution that directed work-experience makes to important objectives, proximate and remote, of specialized vocational agricultural education.

Directed work-experience had a major impact upon one very relevant aspect of the process of vocational preparation. It resulted in the more extensive direct exposure of vocational students to the real world of adult employment than is typical of conventional vocational courses. Assuming that actual first-hand experience provides a more fertile basis for learning than vicarious sources of knowledge and experience, the Try-Out Center programs actually did achieve the objective of promoting extensive pre-graduation employment for vocational students. Part of the student's preparation for entry into adult employment actually included controlled familiarization with the radical transition from school to employment. Not only was the incidence of pre-graduation employment at

Try-Out Centers notable in itself, it exceeded the rate of pre-graduation employment observed for students of conventionally administered programs at Comparison Centers. The adoption of directed work-experience as an integral aspect of the vocational course of study, therefore, has more than negligible or perfunctory impact on the educational course of events. Even granting the educational and vocational benefits of directed work-experience for students who do capitalize on the opportunity, the more fundamental question of feasibility is at stake here. Will students respond in sufficient numbers to warrant expending the time and effort required to organize, establish, and operate a program of directed work-experience? In other words, does payoff, in terms of student participation, justify a decision to introduce directed work-experience into the vocational program? Data obtained from Try-Out Centers and Comparison Centers point emphatically to an affirmative answer. The establishment of a mechanism to encourage and facilitate student employment as a source of learning does bear fruit. More students engage in pre-graduation employment, and more students obtain jobs actually related to their vocational program where directed work-experience programs are established. In the judgment of the investigators, given evidence supporting the superior attainment of educational and occupational objectives as well, directed work-experience programs are justified by the magnitude of student response.

On the other hand, the failure of programs of directed work-experience to exercise greater holding power over students than conventional programs does not, under the circumstances, appear to be a crucial defect. The failure to observe the hypothesized outcome of lower drop-out rates at Try-Out Centers is attributable in part to the investigators' underestimation of the holding power already exercised by conventional programs of specialized instruction in off-farm agricultural occupations. This does not mean to imply that the holding power of Try-Out and Comparison Center programs (91 percent and 92 percent respectively) are exceptional by any standard. Drop-out rates in the neighborhood of ten percent of high school senior enrollment is far from encouraging. Nonetheless, considering the tendency for vocational programs to include a disproportionate number of poor achievers, a retention rate of 90 percent of better among seniors does not compare unfavorably with programs typified by students of greater ability.

Given assurance of the feasibility of directed work-experience, the ultimate criterion of a vocational program's value is its contribution to the attainment of relevant educational and occupational objectives. The superior technological achievement of Try-Out Center students supports a conclusion that directed work-experience does enhance the attainment of the vocational program's educational goals. Its greater efficacy recommends directed work-experience, all else being equal, as a preferred approach to preparing students for entry into off-farm agricultural occupations. Note, however, that the comparative superiority of work-experience programs does not warrant the devaluation of the contribution of the conventional program to vocational preparation. The quality of vocational education in the Comparison Centers is undisputed. Intensive inquiry

prior to selection convinced the investigators of the excellence, by current standards, of Comparison Center programs. The superiority attained by participants in directed work-experience is, after all, strictly relative. There would be little to recommend innovative approaches that surpass in effectiveness programs of merely indifferent merit. From the Comparison Centers the directed work-experience programs withstood a rigorous challenge. Directed work-experience, therefore, has a unique contribution to make to the occupational preparation of vocational students. Incorporating the added dimension of controlled employment experience into formal education enables the student to take with him into the adult world of work an increased measure of competence. The implications of directed work-experience could well be far-reaching, promoting greater individual opportunity and a more productive utilization of manpower resources.

Conclusions drawn from the short-term follow-up of students' post-high school pursuits must be viewed with some caution. Conclusions about the impact of directed work-experience must be projected no further than the attainment of entry status in a field of adult employment or higher education. The implications of directed work-experience for stages of vocational development beyond the entry stage remain uncertain. The basis for this judgment is the fact that short-term follow-up permits a survey of no more than the first steps of the young adult in the most unstable period of his occupational career. The findings of luminaries in the field of vocational development theory like Hoppock, Ginzberg, et al., and Super and Roe point to the unreliability of projecting the future course of events from performance at the virtual point of entry into the occupational structure.

Although there is no basis, therefore, in the follow-up findings for identifying remote effects of participation in directed work-experience, the survey does uncover impressive proximate results. Students of Try-Out Center programs -- both in general and those who actually participated in directed work-experience -- enter occupations related to their vocational course of study with greater frequency than students of more conventional programs. Try-Out Center students also more frequently pursue advanced study in areas related to their high school preparation. On the other hand, the most striking observation concerning Comparison Center students was the extent to which they found entry level jobs in occupations unrelated to their vocational training. The objective of specialized vocational agriculture programs, the preparation of students for entry into one of the off-farm agricultural occupations is apparently served to better advantage by directed work-experience programs than by conventional programs. In terms of personal achievement, the directed work-experience program enhances the individual's prospects of fulfilling the occupational aspirations that his selection of high school program implies. The directed work-experience program appears to result, therefore, in a stronger identification of the student with the occupational area for which he prepares.

With regard to the continuation of formal education beyond high school, a further contrast is observed. In the first place, directed

work-experience programs result in more frequent entry into curriculum-related pursuits. In addition, the rate at which work-experience participants embark upon post-secondary education in general exceeds the rate observed for graduates of conventional secondary programs in vocational agriculture. In the light of one additional fact, this discovery attains a high level of practical significance. Vocational programs in the secondary school are characteristically regarded as terminal. For both conventional and directed work-experience programs in off-farm agricultural specialties this reputation is belied by the evidence. Clearly, neither program serves as a deterrent to entrance into higher education. A very respectable percentage of graduates emerging from both programs embark upon programs involving two or more years of advanced training. Directed work-experience programs, moreover, appear to promote an even higher rate of entry into college than conventional programs in vocational agriculture. It is quite noteworthy, furthermore, that four-fifths of those who entered college from Try-Out Centers and 50 percent of those who entered college from Comparison Centers elected to major in technical, agriculture-related fields. It appears quite likely that secondary vocational preparation has effectively opened the opportunity for advanced technical training to many to whom higher academic pursuits would be unequivocally closed. Furthermore, directed work-experience apparently represents a stronger stimulus to undertake this advanced technical schooling than does the conventional program in vocational agriculture. Participants in directed work-experience were confronted with experiential evidence of the opportunities that accompany higher levels of occupational proficiency and the penalties that attend semi-skilled status. The proximity of this experience to the career choice-point reached at graduation appeared to have an efficacious impact on Try-Out Center students. It represented for Try-Out Center students a source of incentive denied to students of conventional programs.

D. Justification of a Minimum Work-Experience Requirement:

As hypothesized, no conclusive evidence supporting the imposition of an arbitrary amount of work-experience emerged from the observed results in this study. On the contrary, achievement in technical knowledge and competence, job satisfaction, and employment follow-up criteria for two groups of directed work-experience participants did not differ as a function of group differences in the number of hours worked. Students engaged in directed work-experience were permitted, within rather flexible limits, to exercise personal discretion or preference regarding the amount of work-experience they obtained. Allowing students such latitude of choice is in direct opposition to the convictions expressed by vocational educators in virtually all fields of vocational and occupational education. It may appear, at first glance, inappropriate to have evaluated the effectiveness of a work-experience requirement by failing to establish and evaluate a requirement directly. The initial research design did, in fact, define a procedure for the establishment of different requirements for each of two participating student groups. However, it became increasingly apparent, early in the development of project-affiliated programs, that careful control over the extent of student experience was not only difficult but impracticable. Consequently the effort to control the extent

of work was abandoned in favor of a more attainable and realistic approach.

Even ardent enthusiasts for a minimum experience requirement do not, of course, attribute educational efficacy to the existence of a requirement as such. They are concerned with insuring the sufficiency of the duration and extent of work-experience. Insistence on minimum requirements appears implicitly skeptical of student motivation to persevere without coercion in the fulfillment of work-experience needs. This study did not presume to question the general principle that the extent of an individual student's work-experience program is relevant to the level and quality of his learning and achievement. However, the study seriously questioned the assumption of co-linearity between the achievement of vocational/educational objectives and the amount of student work-experience obtained. If, indeed, co-linearity does not exist, then the educational justification of minimum requirements is questionable; and the objective then should become the fulfillment of individual need rather than the attainment of an arbitrary quota. It should, moreover, be noted that the effectiveness of student self-determination regarding the extent and duration of work-experience is not known to have been seriously explored in the past.

It was discovered, first of all, that encouragement, rather than enforcement of minimum requirements, sufficed to elicit a considerable level of perseverance in work-experience from students enrolled in programs affiliated with the study. Students who fell into the "low" experience group -- those below the median number of hours worked -- averaged close to 300 hours of work-experience, the amount frequently recommended as a minimum requirement. Students in the "high" experience group -- those above the median number of hours worked -- averaged considerably higher than 600 hours, the maximum requirement suggested by the most demanding vocational educators. Motivation is obviously not lacking among students enrolled in experience programs in off-farm occupational programs in vocational agricultural education. A minimum requirement, therefore, does not appear necessary in addition to the intrinsic encouragement and motivational impact that characterize well organized programs of directed work-experience.

Furthermore, the criterion performance of students -- level of technical achievement, job satisfaction, and entry into program-related employment -- did not differ with variation in the duration and extent of employment. This suggests that, under the Guidelines and Procedures, students do tend to engage in enough work-experience to meet their educational needs. Either of two alternative explanations may account for this phenomenon. Either students, of their own accord, meet and exceed a common standard that educators have tended to over-estimate in the past; or individual students tend to gravitate to differential levels of work-experience which satisfy their personal needs. In either case, given a well-organized program that strongly encourages participation in directed work-experience, the establishment of a minimum requirement appears to be an unnecessary burden. Though the evidence is far from conclusive, and though further inquiry into this area is desirable, the authors feel that their data suggest these implications very strongly. Because there has been no explicit and controlled

test of the effectiveness of various work-experience requirements as such, no definitive conclusions are possible. However, the investigation has uncovered two relevant facts: 1) Even in the absence of explicit time requirements, students do achieve the educational and occupational objectives of the directed work-experience program. Collateral evidence to this effect is conclusive; participating teachers, distinguished for their competence, testify decisively and favorably to the acceptability of the outcomes relative to program objectives. 2) These outcomes, moreover, do not differ materially for two student groups as a function of differences in the extent of their work-experience. The investigators would urge, therefore, for similarly organized programs that consideration be given to extending to students the autonomy of arranging the length of their individual directed work-experience placements.

There was one exception to the failure to find group differences as a function of the extent of student work-experience. Mean performance ratings assigned by employers to student participants did differ significantly and favored the "high" experience group. However, employer ratings were strongly positive and favorable for both "high" and "low" experience groups. The difference observed, therefore, is quantitative only, and not qualitative. Student performance, even for the less experienced group is, in other words, both pleasing and acceptable to employers. Furthermore, evidence gathered in the process of designing the Guidelines and Procedures suggests that observed differences in employer ratings may be attributable to a priori employer attitudes and preferences. A survey conducted in advance of the establishment of directed work-experience programs¹¹⁸ found that prospective employers expressed the greatest concern over the duration of student placement for work-experience. Employer preference for maximizing student work hours may be the real source of variation in mean employer ratings for "high" and "low" experience groups. Employers may well be predisposed to rate more favorably those students who engage in a greater amount of directed work-experience.

APPENDIX A

Participating Personnel

1. PANEL OF CONSULTANTS

Mr. Acee M. Acee, Clark Mills Farm Supply, Clark Mills, New York

Miss Henrietta Brown, New York State Employment Service, Ithaca, New York

Dr. Felician F. Foltman, Associate Professor, Industrial and Labor Relations, Cornell University, Ithaca, New York

Dr. E. John Gradoni, Associate in Distributive Education, State Education Department, Albany 1, New York

Professor Mauritz Johnson, Head, Education Department, Stone Hall, Cornell University, Ithaca, New York

Mr. Edwin Komendarek, Vocational Director, Steuben School, 401 E. German Street, Herkimer, New York

Mr. William F. Kuhl, Sales Manager, Shepard Nurseries, Skaneateles, New York

Dr. Helen Y. Nelson, Associate Professor, Home Economics Education, Cornell University, Ithaca, New York

Dr. Harold Noakes, Chief, Bureau of Agricultural Education, State Education Department, Albany 1, New York

Dr. Alan Robertson, Associate in Vocational Education Research, State Education Department, Albany 1, New York

Mr. Charles Saxton, Distributive Education, Coordinator, Ithaca High School, Ithaca, New York

Mrs. Jean Snyder, Teacher of Home Economics, Ithaca High School, Ithaca, New York

2. TRY-OUT CENTER TEACHER-COORDINATORS

The teachers listed below were deeply involved at the local level in all the operational phases of the project. They also attended orientation and evaluation meetings at Cornell University on three separate occasions during the summers of 1966 and 1967. They are, therefore, thoroughly familiar with the project effort and, in their own right, qualify as experts in the area of directed work-experience for vocational training in off-farm agricultural occupations. The project staff urges the recognition and

use of these competent specialists as resource persons, particularly at state and local levels. They have at their disposal a wealth of experience and information that could contribute substantially to the development of new programs. Their assistance as consultants would be invaluable in promoting the growth, re-organization, and efficiency of existing programs.

a. Agricultural Mechanization

Mr. Lowell Cook, Agriculture Mechanics Teacher, Point Pleasant High School, Point Pleasant, West Virginia

Mr. Richard Harrison, Agriculture Mechanics Teacher, Southern Cayuga Central School, King Ferry, New York

Mr. Robert Herr, Agriculture Mechanics Teacher, Garden Spot High School, New Holland, Pennsylvania

Mr. Charles Howard, Agricultural Mechanics Department, Norfolk County Agricultural High School, Walpole, Massachusetts

Mr. James Martindale, Agricultural Mechanics Teacher, Cato Central School, Cato, New York

Mr. LeRoy Nichols, Agricultural Mechanics Teacher, Lewis County Area Vocational Center, P.O. Box 146, Lowville, New York

Mr. Edwin Russell, Agricultural Mechanics Teacher, BOCES Agricultural Center, Malone, New York

b. Ornamental Horticulture

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8. GRADUATE ASSISTANTS AND OTHER PROJECT PERSONNEL

<u>Name</u>	<u>Position</u>	<u>Period of Employment</u>
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Arsenio Gagni	Research Assistant	Oct. 1, 1965 - June 30, 1968
William Kelly	Research Assistant	Oct. 1, 1966 - June 30, 1968
Robert Norton	Research Assistant	Oct. 1, 1965 - Sept. 30, 1966
James Christener	Associate Investigator	May 15, 1966 - July 15, 1966
Mrs. Maria Corpuz	Stenographer I	Oct. 11, 1965 - Aug. 31, 1966
Miss Patricia Lane	Stenographer I	Sept. 21, 1966 - Mar. 31, 1967
Mrs. Marilyn Hine	Steno-Typist	July 1, 1967 - June 30, 1968

APPENDIX B

Section I

Achievement Tests

TEST IN

ORNAMENTAL HORTICULTURE

Cornell University
Department of Education

DIRECTIONS TO THE TEACHER

ORNAMENTAL HORTICULTURE

- 1) Read the Directions to Students for the TEST IN ORNAMENTAL HORTICULTURE in advance, so you can answer questions about their meaning if necessary.
- 2) The test booklets for your class are numbered: Please administer the test booklets in that order.
- 3) Start by giving each student a sheet of the Directions to Students and one answer sheet. Have the students read the directions. Then have them write their own name and the school's name in the proper blanks on the answer sheet. The other blanks at the top of the page may be ignored. Remind them that they must write their name and the school's name on every answer sheet they use. (Ignore the section labeled Identification Number on the answer sheets; they are for Cornell use).
- 4) Call the students' attention to the fact that the items are numbered across the rows of the answer sheets, rather than down the columns. (This is important, since people tend not to notice the numbering, and begin to record responses down the first column.)
- 5) Distribute the first part of the test and have the students begin work.
- 6) Circulate through the room, and check each student's answer sheet. Be sure that each student is marking his answers properly on the answer sheet. (Neatly, heavily, and across the rows.)
- 7) When a student completes one part of the test, collect the test booklet and answer sheet from him, and give him the next part of the test and a fresh answer sheet. Check occasionally to make sure that the students record their names on all answer sheets.
- 8) Keep answer sheets for different parts of the test separate. Return the answer sheets for each part of the test in the envelope in which you receive the test booklets for that part.
- 9) Do not answer student questions about the content of test items. You should help students only to the extent of seeing that they follow directions.
- 10) There is no time limit for the test. Please enclose a note with your returns indicating the amount of time required for your fastest student and your slowest student to complete the test.
- 11) If a student spoils an answer sheet during the test, have him complete the test on the spoiled answer sheet. After he has completed the test, have him transfer his answers from the spoiled answer sheet to a fresh answer sheet. Extra sheets are provided for this purpose. Do not return spoiled answer sheets.

12) If unforeseen problems arise in administering the test, resolve them according to your best judgment. Please inform us of the circumstances of such difficulties when making your returns.

TEST IN ORNAMENTAL HORTICULTURE

DIRECTIONS:

Read all these directions before you begin to answer any test questions.

On this test we want to find out some of the things you have learned in Ornamental Horticulture. You are not expected to be able to answer every question, so you should not worry if there are a number of questions that you cannot answer. Answer the questions you are able to answer, but do not spend a lot of time trying to figure out answers you don't know. When you are not sure about an answer, if you think you can make a pretty good guess at the correct answer, then go ahead and make a guess.

The test is made up of several parts. Each part is in a separate booklet. And you must use a different answer sheet for each part.

All your answers should be made on the answer sheets given to you by the teacher. DO NOT WRITE YOUR ANSWERS IN THE TEST BOOKLETS.

This is how you should make your answers on the answer sheet:

(1) Read the question and decide which of the four possible answers is the best answer. If you think a question has more than one correct answer, then you should pick the best answer to the question.

(2) Then find the item on the answer sheet that is numbered the same as the test question.

(3) Blacken with your pencil the space on that item that has the same number as the answer you selected.

EXAMPLE: Suppose question number one goes like this:

- 1) The color of chlorophyll is
(1) Red (2) Gray (3) Green (4) Orange.

For question number 1 you would pick Green as your answer. You would find item number 1 on the answer sheet. And because Green is answer number 3 on the first question, you would blacken space number 3 of the first item on the answer sheet.

Be sure to make your marks on the answer sheet heavy and dark. Make sure your mark completely fills the narrow space between the dotted lines. Do not get any stray pencil marks on the other parts of the answer sheet. And if you have to change an answer, erase your first mark completely.

Write your name and the name of your school in the proper blanks on every answer sheet you use.

Subtest 1

Floristry

1. Floriculture courses offered by universities place greatest emphasis on:
(1) Floral arrangement (2) Retail merchandising (3) Wholesale marketing
(4) Production and growth
2. A prime location for a retail florist shop would be:
(1) In the middle of a residential block (2) Beside a rural nursery
(3) In a shopping center (4) On a side street
3. The most important feature to consider in equipping a florist shop is the:
(1) Lighting (2) Interior decoration (3) Air conditioning (4) Display refrigerator
4. Which flower bleeds a milky sap when the stem is cut:
(1) Poinsettia (2) Rhododendron (3) Carnation (4) Chrysanthemum
5. Damage to florist stock from excessive transpiration is usually caused by:
(1) Sunlight (2) Drafts (3) Water (4) Plant food
6. What is used to harden cut flowers for sale?
(1) Heat (2) Light (3) Water (4) Air
7. A common practice for preserving ready-made corsages is:
(1) Storage in water at room temperature (2) Airtight storage at room temperature
(3) Refrigeration in the shipping container (4) Refrigerated storage in stock vases
8. Most foliage used by florists in arrangements can be stored:
(1) Under refrigeration (2) In a warm, damp place (3) In any dark place
(4) None of these
9. The best florist practice for dealing with overstocked items is to:
(1) Discard "pickled" (aged) stock (2) Sell inferior (aged) stock at a discount
(3) Order less stock than is needed (4) Sell aged stock ahead of fresh stock
10. A variety of small spray Orchids is the:
(1) Eucharis (2) Cattleya (3) Stephanotis (4) Cymbidium
11. The scalene floral design is basically:
(1) A triangle (2) A circle (3) A rectangle (4) An oval
12. Which design would be most symmetrical (perfectly balanced)?
(1) Fan arrangement (2) Crescent arrangement (3) Scalene arrangement
(4) Right triangle arrangement

13. Since most florist stock is sold quickly, what condition affects flowers the least in the shop?
(1) Light (2) Temperature (3) Humidity (4) Drafts
14. A popular and easy-to-care for flowering house plant is the:
(1) Begonia semperflorens (2) Tuberous-rooted Begonia (3) Camellia
(4) Orchid
15. What condition might seriously harm an African Violet:
(1) Plenty of direct sunlight (2) Plenty of water (3) Humid atmosphere (4) Ordinary room temperature
16. A plant that is not a vine or a trailing plant is the:
(1) Ivy (2) Philodendron (3) Aspidistra (4) Tradescantia
17. A practical plant to use in a small dish garden is:
(1) Sansevieria (2) Caladium (3) Ficus (4) Fern
18. When a floral arrangement gives the viewer an impression of stability, what principle of design is achieved?
(1) Focus (2) Rhythm (3) Proportion (4) Balance
19. If the texture of the flowers and the foliage in an arrangement clash, what principle of design is violated?
(1) Proportion (2) Rhythm (3) Line (4) Harmony
20. The primary colors are:
(1) Red, orange, green (2) Orange, green, violet (3) Red, yellow, blue
(4) All the colors of the spectrum
21. A color to which white has been added is called a:
(1) Tint (2) Secondary color (3) Shade (4) Tone
22. A floral arrangement that is composed of shades of a single color is called:
(1) Complementary (2) Monochromatic (3) Pastel (4) Primary
23. What type of color tends to create a dainty, delicate floral arrangement:
(1) A primary (2) A tint (3) A shade (4) A tone
24. A cut flower whose foliage is damaged quickly by being placed in deep water is:
(1) Dahlia (2) Gladiolus (3) Narcissus (4) Tulip
25. The purpose of waxing Mums at the base of the petals is to prevent:
(1) The closing of blossoms at night (2) Wilting (3) Discoloration
(4) Loss of petals
26. A variety of branched foliage with a fine, delicate texture is:
(1) Plumosus (2) Sansevieria (3) Salal (lemon) (4) Caladium

27. What floral characteristic would be emphasized most in a bunch of pompom mums:
(1) Mass (2) Form (3) Line (4) Accent
28. The Glamellia is:
(1) An F-1 hybrid (2) A dwarf variety of Camellia (3) A tropical flower resembling the Gladiolus (4) A flower constructed from Gladiolus petals
29. The most frequently used gauge of floral wire is:
(1) #12 (2) #26 (3) #36 (4) #48
30. Which gauge of floral wire has the smallest diameter?
(1) #16 (2) #20 (3) #24 (4) #28
31. What wiring method is most popular for wiring the foliage and flower petals of corsages:
(1) Insertion method (2) Hairpin method (3) Hook method (4) Extension method
32. Single Camellias are usually wired with:
(1) Hairpins inserted into the throat of the flower (2) Hooks inserted into the side of the flower (3) A single hook inserted into the flower bead (4) A single wire inserted through the hollow stem
33. What is used to secure foliage to wreath and spray foundations?
(1) Greening pin (2) Pick (3) Hook (4) Frog
34. Which of the following widths of floral ribbon is the widest?
(1) #3 (2) #5 (3) #40 (4) #100
35. The type of container is usually least important to the design of:
(1) An end-table arrangement (2) A miniature arrangement (3) A banquet-table arrangement (4) A mantel arrangement
36. Oriental floral designs are especially known for being:
(1) Large (2) Practical (3) Symbolic (4) Artificial
37. The largest variety of Orchid is the:
(1) Cymbidium (2) Phalaenopsis (3) Cattleya (4) Vanda
38. A corsage flower constructed from the buds and petals of several roses is called a:
(1) Queen Elizabeth Rose (2) Victorian Rose (3) Crimson Duke Rose (4) American Heritage Rose
39. What flower is traditionally considered to make the most elegant corsage?
(1) Rose (2) Carnation (3) Camellia (4) Orchid
40. What flower would you suggest for a corsage to be worn at a football game?
(1) Orchid (2) Glamellia (3) Mum (4) Victorian Rose

41. The most popular style of corsage is worn:
(1) At the shoulder (2) On the wrist (3) At the waist (4) In the hair
42. What type of boutonniere would not be proper at a formal wedding?
(1) Carnation (2) Rose (3) Pom Pom Mum (4) Stephanotis
43. The most informal design for a bridal bouquet is the:
(1) Colonial (2) Cascade (3) Crescent (4) Triangular
44. The cloth runner on the aisle at a church wedding is furnished by the:
(1) Florist (2) Caterer (3) Photographer (4) Church
45. A way of increasing the sales volume of funeral arrangements that is not appropriate is:
(1) Specializing in funeral work (2) Newspaper advertising (3) Radio advertising (4) Telephone solicitations
46. For the best appearing funeral piece, the flowers in the arrangement should include:
(1) Tight buds (2) Partially open buds (3) Full blooming flowers (4) All of these
47. Which design is most appropriate for a funeral spray:
(1) Oval (2) Circle (3) Crescent (4) Rectangle
48. In constructing a funeral spray, the florist should avoid:
(1) The use of ribbon (2) A flat effect (3) A monochromatic color scheme (4) A tailored effect
49. A funeral spray with a bow at one end is called a:
(1) Tied spray (2) Single spray (3) Picked spray (4) Double spray
50. It is customary to avoid placing the cluster (focal point) of a wreath:
(1) At the top (2) At the bottom (3) On the right side (4) On the left side
51. What is ordinarily used to fasten foliage and ribbon to the foundation of a wreath?
(1) Floral tape (2) Easel (3) Pick (4) Greening pin
52. A neat, tailored wreath is a design most appropriate for the funeral of:
(1) A child (2) A woman (3) A man (4) Any of these
53. A casket spray is customarily ordered by the deceased person's:
(1) Business associates (2) Employer (3) Family (4) Friends
54. A casket piece is generally used in order to:
(1) Soften casket lines (2) Make the casket the focal point (3) Harmonize the casket with other floral arrangements (4) Brighten the dark appearance of the casket

55. A large casket piece should be held in place with:
(1) A saddle plaque (2) An easel (3) Tape or ribbon (4) Florist's clay
56. At a military funeral service, what type of casket cover is appropriate:
(1) A spray (2) A flexible wreath (3) A floral cross (4) None of these
57. What type of casket cover is ordered most frequently?
(1) Wreath (2) Spray (3) Pall (4) Blanket
58. In planning floral pieces with a customer for a wedding, what should the florist discuss first?
(1) How much the customer can afford (2) The customer's preferences
(3) The location of the service (4) The number of floral pieces required.
59. Most foliage type of potted plants are native to:
(1) Tropical countries (2) Europe (3) The U. S. (4) All of these
60. The demand for most types of flowering pot plants depends chiefly on:
(1) The cost (2) The florist's display (3) The size and color of the plant (4) The season
61. The most popular material for trimming potted plants is:
(1) Cellophane (2) Crepe paper (3) Foil (4) Gift paper
62. What factor is more important in dish garden designs than in floral arrangements?
(1) Color (2) Proportion (3) Size (4) Growth
63. A plant soil mixture composed of 1/3 sharp sand, 1/3 peat moss, and 1/3 soil does not:
(1) Hold nutrients well (2) Have high fertility (3) Hold water
(4) Have good aeration
64. The three basic symbols of Oriental flower arranging do not include:
(1) Heaven (2) Earth (3) Ocean (4) Man
65. A cooperative corporation of florists that specializes in flowers-by-wire service is:
(1) F.T.D. (2) A.S.F. (3) N.F.S. (4) A.C.S.

Subtest 2

Floriculture

1. Corms, bulbs, and rhizomes are:
(1) Roots (2) Seeds (3) Stems (4) Rootstocks
2. The most popular types of pot mums are the:
(1) Incurved varieties (2) Pompon varieties (3) Spider varieties
(4) Anemone varieties
3. Select the phrase below that best describes the nature and function of a commercial greenhouse:
(1) Controlled environment (2) Permanent structure (3) Indoor crop-site (4) Botanical laboratory
4. A major advantage of plastic houses over glass houses is:
(1) Construction costs (2) Rate of depreciation (3) Temperature control (4) Ventilation
5. Roses that require severe pruning are the:
(1) Rugosa (2) Ramblers (3) Climbers (4) Hybrid Teas
6. How long should Poinsettia cuttings be?
(1) 1" to 3" (2) 4" to 6" (3) 7" to 10" (4) Over 10"
7. The propagation of Mums in large quantities for commercial purposes is usually by:
(1) Grafting (2) Cutting (3) Dividing (4) Seed
8. How are Hybrid Teas, Floribunda, and Grandiflora Roses usually propagated?
(1) Budding (2) Seed (3) Layering (4) Breaking
9. A shipment of Rose plants purchased for retail sales as pot plants should be:
(1) Stored in a dark, humid place (2) Watered, pruned, and potted immediately (3) Refrigerated (4) Wrapped in wet burlap
10. The most popular cut flower for commercial sales is the:
(1) Rose (2) Chrysanthemum (3) Lily (4) Gladiolus
11. The fastest way to obtain a second crop of Carnations is to:
(1) Cut the first crop to soil level (2) Replant (3) Cut the first crop to lateral breaks (4) Pinch lateral breaks after harvesting first crop
12. The color of the most popular Carnation varieties is:
(1) White (2) Salmon (3) Red (4) Yellow
13. In a year-round Mum program, how many crops per bench can be grown in a year:
(1) 1 (2) 3 (3) 6 (4) 8

14. A disadvantage of steam sterilization (180° for 30 minutes) of bench soil is:
(1) Hardy weeds survive (2) Soil fertility is lowered (3) Beneficial bacteria may be killed (4) pH is neutralized
15. The chief means of preventing Mums from setting bud too early is to control:
(1) Daylength (2) Temperature (3) Moisture (4) Nutrition
16. To produce a single stem Mum:
(1) Do not pinch (2) Take the terminal bud (3) Take the crown bud (4) Delay pinching
17. The most popular strain of Easter Lily produced in the U. S. is the:
(1) Georgia (2) Ace (3) Croft (4) Nellie White
18. To insure best performance, what procedure is recommended upon delivery of Lily bulbs?
(1) Storage in a warm humid place (2) Refrigeration (3) Storage at room temperature (4) Immediate potting
19. A retardant is a chemical used to control:
(1) Flowering date (2) Foliage growth (3) Flower size (4) Stem growth
20. The time required from potting to flowering of Easter Lilies is about:
(1) 60 days (2) 90 days (3) 120 days (4) 150 days
21. A condition that tends to result in shorter Lilies is:
(1) Crowding (2) Overwatering (3) Insufficient fertilizer (4) Exposure to sunlight
22. What is likely to result with Lilies grown at high temperatures in dry air?
(1) Shortened stems (2) Bud blasting (3) Leaf scorch (4) Chlorosis
23. Geranium cuttings planted in December should yield salable plants for:
(1) Valentine's Day (2) Memorial Day (3) St. Patrick's Day (4) July 4th
24. Rooting of Geranium cuttings may be hastened by:
(1) Bottom heat (2) Direct sunlight (3) Low temperatures (4) High humidity
25. Culture-indexed cuttings are guaranteed:
(1) To be immune to disease (2) To be disease free (3) To germinate (4) To grow
26. Pinching has the same effect on almost all plants:
(1) Branching (2) Shortening (3) Early flowering (4) None of these

27. Geraniums are most commonly sold in:
(1) 2" pots (2) 3" pots (3) 4" pots (4) 6" pots
28. The least desirable rooting medium for Geraniums is:
(1) Peat and perlite (2) Garden soil (3) Peat pots (4) Course sand
29. The Poinsettia was introduced into the U. S. from what country?
(1) Morocco (2) Spain (3) Mexico (4) Japan
30. What condition is required to promote the flowering of Poinsettias?
(1) Low nutrition (2) Low light intensity (3) Short days (4) Low soil moisture
31. The length of Poinsettia cuttings should be about:
(1) 1" (2) 4" (3) 7" (4) 10"
32. Poinsettia plants are prized chiefly because of the color of their:
(1) Blooms (2) Leaves (3) Bracts (4) Buds
33. How many Tulip bulbs should be forced in a 6 inch pot?
(1) 6 (2) 4 (3) 2 (4) 1
34. Greenhouse propagation of Snapdragons is by:
(1) Layering (2) Cutting (3) Budding (4) Seed
35. Snapdragons should be transplanted from the propagation medium to the growing bench when:
(1) The plant germinates (2) The first true leaves appear (3) Buds appear (4) The flats become crowded
36. Growth of Azaleas is best when soil pH is about:
(1) 5 (2) 7 (3) 9 (4) 11
37. Bedding plants are usually seeded in:
(1) Benches (2) Clay pots (3) Peat pots (4) Flats
38. In transplanting seedlings, how should they be handled?
(1) With a dibble stick (2) With a spade (3) By the stem (4) By the leaves
39. What soil condition is undesirable for growing bedding plants from seed?
(1) Moist (2) Neutral pH (3) Warm (4) High fertility
40. The most popular bedding plant is the:
(1) Petunia (2) Zinnia (3) Salvia (4) Begonia
41. Plants that have a few large flowers per plant are called:
(1) Multiflora (2) Doubles (3) Grandiflora (4) Floribunda
42. The removal of the tip of the stem to encourage branching is called:
(1) Cutting (2) Disbudding (3) Wounding (4) Pinching

43. A disbud has how many flowers per stem:
(1) 1 (2) 2 (3) None (4) Many
44. An example of sexual reproduction in plants is:
(1) A cutting (2) A seedling (3) Vegetative growth (4) Rooting
45. An artificial rooting medium is:
(1) Garden soil (2) Loam (3) Vermiculite (4) Sand

Subtest 3

Landscape Nursery Production and Maintenance of Landscape Ornamentals

1. In trimming a deciduous hedge the top should be pruned so that it is:
(1) Square (2) Narrower than the bottom (3) Flat (4) None of these
2. The botanical name for Japanese Yew is:
(1) *Kalmia latifolia* (2) *Taxus cuspidata* (3) *Ligustrum* (4) *Buxus japonica*
3. The botanical name for White Oak is:
(1) *Acer saccharum* (2) *Quercus palustris* (3) *Quercus alba* (4) *Acer platanoides*
4. The botanical name for Mountain Laurel is:
(1) *Juniperus virginiana* (2) *Ligustrum* (3) *Taxus* (4) *Kalmia latifolia*
5. The botanical name for the Pagoda Dogwood is:
(1) *Ligustrum ibota* (2) *Ilex verticillata* (3) *Wisteria floribunda*
(4) *Cornus alternifolia*
6. The botanical genus to which the various species of Hemlock belong is:
(1) *Tsuga* (2) *Acer* (3) *Quercus* (4) *Pinus*
7. The botanical name for Common Lilac is:
(1) *Syringa vulgaris* (2) *Buxus sempervirens* (3) *Malus halliana*
(4) *Vinca minor*
8. The botanical name for American Holly is:
(1) *Malus sargentii* (2) *Thuja occidentalis* (3) *Taxus cuspidata*
(4) *Ilex opaca*
9. In spraying, coverage can be made more effective by:
(1) Spraying frequently (2) Increased pressure (3) Decreased pressure
(4) Increased concentration of mixture
10. A material used to aid root development and root strength is:
(1) B-nine (2) IBA (3) VPM (4) PCNB
11. The best all-around large shade-frame tree is the:
(1) Sugar Maple (2) Silver Maple (3) Box Elder (4) White Ash
12. What part of the scion and parent must be in contact for a graft to succeed?
(1) Cortex (2) Cambium (3) Xylem (4) Phloem
13. Plant respiration is most likely to be poor in what kind of planting medium:
(1) Sharp sand (2) Peat and perlite (3) Sandy loam (4) Clay

14. The sash house is a structure used primarily to:
(1) Start plants (2) Store container stock (3) Store tools and equipment (4) Treat diseased plants
15. A hardy, rapid growing, pink-flowering tree that reaches a height of twenty-five feet is:
(1) Washington Hawthorn (2) Silver Maple (3) Japanese Cherry (4) Amur Privet
16. The temperature of the rooting medium for propagating most ornamental landscape plants should be:
(1) 50° - 55° (2) 62° - 68° (3) 68° - 72° (4) 78° - 82°
17. Nursery stock is "lined-out" in the:
(1) Sash house (2) Field (3) Lath house (4) Garden Center
18. The loss of soil nutrients dissolved by water in the soil is called:
(1) Eluviation (2) Drainage (3) Saturation (4) Leaching
19. The caliper of nursery stock refers to:
(1) Height (2) Trunk diameter (3) Spread of branches (4) Circumference
20. Caliper is ordinarily used to grade:
(1) Deciduous trees (2) Narrow-leaf evergreen shrubs (3) Broad-leaf evergreen shrubs (4) Narrow-leaf evergreen trees
21. In bare-root transplanting of deciduous trees and shrubs, what compensates for the loss of roots?
(1) Feeding (2) Watering (3) Pruning (4) Staking
22. How frequently should ornamental trees and shrubs be fertilized?
(1) Yearly (2) Every 4 years (3) Every 6 years (4) Never
23. A deciduous plant:
(1) Flowers in the spring (2) Remains green all winter (3) Loses its leaves in the fall (4) Dies to the ground in winter
24. One year old twigs remain green on:
(1) Cedar (2) Yew (3) Hemlock (4) Spruce
25. The type of evergreen on which leaves are found in bundles is the:
(1) Spruce (2) Fir (3) Pine (4) Hemlock
26. An evergreen on which the bark is very thin and has the appearance of being shredded is the:
(1) Shortleaf (yellow) pine (2) Eastern Redcedar (3) Eastern Hemlock (4) Eastern White Pine
27. Which is the most popular as a foundation plant for home landscaping?
(1) Yew (2) Abelia (3) Pine (4) Spruce

28. Severe chlorosis between the veins at the top of a plant probably indicates a deficiency of:
(1) Nitrogen (2) Magnesium (3) Calcium (4) Iron
29. A purple color along the veins of leaves probably indicates a deficiency of:
(1) Potash (2) Iron (3) Nitrogen (4) Phosphorus
30. Which evergreen has the least commercial value in the production and marketing of Christmas trees:
(1) Hemlock (2) Spruce (3) Fir (4) Pine
31. An "evergreen" that is really deciduous is the:
(1) Pine (2) Hemlock (3) Larch (4) Spruce
32. The term for preparing the end of a cutting for propagation is:
(1) Bruising (2) Cutting (3) Wounding (4) Scraping
33. A material used in sprays to insure sufficient contact with the leaves of plants is called:
(1) Regulant (2) Retardant (3) Spreader (4) Hormone
34. What species of tree would you recommend for reforestation to prevent soil erosion:
(1) Hickory (2) Scotch Pine (3) Red Oak (4) Sugar Maple
35. What soil color is an indication of poor drainage?
(1) Brown (2) Yellow (3) Red (4) Gray
36. The organic carrier of all three elements recommended for broadleaf evergreens is:
(1) Cottonseed meal (2) Wood ashes (3) Manure (4) Leaf mulch

Subtest 4

Lawn and Landscape

1. Three factors necessary to seed germination are:
(1) Air, light, heat (2) Air, heat, moisture (3) Heat, moisture, light (4) Air, light, moisture
2. Which grass is recommended for shady, moist place:
(1) Poa Trivialis (2) Poa Memoralis (3) Poa Pratensis (4) Poa Compressa
3. To make a 30" by 40" scaled drawing of a landscape plot that measures 120' by 160', how would you scale the drawing?
(1) 1/8" equals 1 foot (2) 1/4" equals 1 foot (3) 1/2" equals 1 foot (4) 3/4" equals 1 foot
4. A type of grass recommended for dry, shady places is:
(1) Bluegrass (2) Fescue (3) Bent (4) Rye
5. Weedkiller 2-4D plus Silvex is toxic to:
(1) Bluegrass (2) Bent (3) Clover (4) Rye
6. The minimum amount of pure live grass seed required to seed 1,000 square feet of new lawn is about:
(1) 500,000 (2) 1,500,000 (3) 5,000,000 (4) 7,000,000
7. A fertilizer mixture that should meet the nutrition requirements of most lawns in the Northeast is:
(1) 10-6-4 (2) 0-5-10 (3) 10-20-30 (4) 10-0-10
8. What is an advantage of including a nurse grass in a lawn seed mixture?
(1) It has long life (2) It resists drought (3) It resists disease (4) It matures early
9. A greater percentage of grass seed will germinate and survive if it is sown in:
(1) Early fall (2) Mid-summer (3) Early spring (4) Early summer
10. To avoid losing grass seed on slopes and unlevel ground:
(1) Water heavily after sowing (2) Rake seeds in deep (3) Fence off the seeded area (4) Cover the seeded area with straw
11. Which grass has the largest number of seed per pound:
(1) Redtop (2) Kentucky Bluegrass (3) Red Fescue (4) Perennial Rye Grass
12. The amount of grass seed needed to provide adequate lawn cover does not depend on:
(1) Seed cost (2) Growth habits (3) Number of seed per pound (4) Time of year

13. A nurse grass is included in a good grass mixture because:
(1) It reduces seed costs (2) It stays greener in hot weather (3) It provides temporary cover while base grass develops (4) It makes superior turf
14. A chemical used to promote root growth is a:
(1) Fertilizer (2) Retardant (3) Herbicide (4) Hormone
15. A variety of Bluegrass is:
(1) Kentucky 31 (2) Merion (3) Pennlawn (4) Colonial
16. Ureaform is:
(1) A synthetic organic fertilizer (2) A natural organic fertilizer
(3) An inorganic fertilizer (4) Not a fertilizer
17. The most popular foundation plants in the Northeastern U. S. are:
(1) Pines (2) Spruces (3) Yews (4) Arborvitae
18. The primary objective of landscaping the public area of a home property is to:
(1) Construct a beautiful lawn (2) Frame and beautify the front view of the house (3) Conceal private areas (4) Shade the front of the house
19. In landscaping the public area of a ranch home, what planting should be avoided?
(1) Frame trees (2) Low foundation shrubs (3) A spruce or pine at the center of the lawn (4) Shrubs at the corners of the property
20. On a well landscaped property, an elaborate formal flower garden should be located in the:
(1) Service area (2) Family living area (3) Private area (4) Public area
21. The width usually accepted as best for a walk is:
(1) 2' (2) 4' (3) 6' (4) 8'
22. The plants that should be located first in the landscape design are:
(1) Border shrubs (2) Trees (3) Foundation plants (4) Deciduous bushes
23. The number of trees needed to frame a house properly on an average size lot is:
(1) 4 or 5 (2) 3 or 4 (3) 2 or 3 (4) 1
24. To achieve an informal landscape design:
(1) Use straight lines and rectangular forms (2) Achieve perfect balance and symmetry (3) Do not plan the location of plants in advance
25. Placing plants of similar size at opposite points in the landscape plan is an example of the principle of:
(1) Scale (2) Unity (3) Harmony (4) Balance

26. Using very low plants as foundation shrubs for a two-story house would violate the principle of:
(1) Unity (2) Scale (3) Simplicity (4) Harmony
27. Placing plants so that they direct attention to an interesting object in the landscape is an application of the principle of:
(1) Harmony (2) Focalization (3) Scale (4) Simplicity
28. An area that is not ordinarily found on a home property is the:
(1) Commercial area (2) Public area (3) Private area (4) Service area
29. What principle of landscape design refers more to the size of plants than to their location?
(1) Balance (2) Unity (3) Scale (4) Harmony
30. In placing plants in the design to create balance, it is most important for them to:
(1) Be of the same species (2) Have the same approximate growth rate
(3) Attract attention (4) Produce flowers or fruit
31. A major objection to selecting an American Elm for a shade-frame tree is that it:
(1) Deprives the soil of nutrients needed by other plants (2) Grows too tall (3) Is very expensive (4) Is subject to disease
32. In the scale drawing of a landscape plan, the trees should be drawn to show:
(1) The height they will reach at maturity (2) Their height at the time of planting (3) Their spread at maturity (4) Their spread at the time of planting

Subtest 5

Trouble, Disease and Pest Control

1. The most common cause of poor root development in plants is:
(1) Soil conditions (2) Atmospheric conditions (3) Disease (4) Pests
2. The weedkiller most toxic to greenhouse crops is:
(1) Sodium Arsenite (2) Karmex (3) DDT (4) 2,4-D
3. The most common insect cause of badly formed flowers in the greenhouse is:
(1) Nematodes (2) Moth larvae (3) Aphids (4) Bacteria
4. What pesticide is effective against all insects and harmless to plants?
(1) No pesticide (2) DDT (3) Baytex (4) Chlordane
5. Which greenhouse pest is most commonly found on greenhouse plants?
(1) Aphid (2) Foliar nematode (3) Thrip (4) Leaf roller
6. Powdery mildew is found most frequently on:
(1) Mums (2) Roses (3) Snapdragons (4) Azaleas
7. A disadvantage of using aerosol insecticides is that:
(1) Aerosol products are more expensive than sprays (2) Aerosols take more time than sprays (3) Aerosols leave unsightly residue on foliage (4) Aerosol equipment is large and clumsy to use
8. Damping-off is a disease that attacks:
(1) Cuttings (2) Buds (3) Grafts (4) Seedlings
9. As a possible cause of chlorosis in Azaleas, you should immediately rule out:
(1) Excessive fertilization (2) Iron deficiency (3) Root damage (4) Low soil pH
10. A soil sterilizer that is non-toxic to plants in nearby greenhouse benches is:
(1) Trizone (2) Formalin (3) Steam (4) Vapam
11. Drafts and low humidity are conditions that increase the rate of:
(1) Respiration (2) Transpiration (3) Photosynthesis (4) Photo-periodism
12. Suggestions for the control of botrytis in the greenhouse usually include:
(1) Reduce humidity (2) Reduce day-length (3) Reduce light intensity (4) Reduce temperature
13. What causes root drop in rooted Carnation cuttings:
(1) Intense light (2) Close spacing (3) Excessive watering (4) High temperatures

14. Chrysanthemum stunt is a disease caused by a:
(1) Virus (2) Fungus (3) Bacteria (4) Nematode
15. Dutch Elm disease is caused by:
(1) Beetles (2) Aphids (3) Mites (4) Mealybugs
16. What is mixed with pesticide sprays to promote good coverage of foliage?
(1) A regulant (2) A hormone (3) A spreader (4) A dye
17. An insect that damages plants, shrubs, and trees by sucking food from the leaves is the:
(1) Grasshopper (2) Japanese Beetle (3) Caterpillar (4) Aphid
18. Mist blowing to control insects on trees should not be done:
(1) On windy days (2) On warm days (3) On sunny days (4) At night
19. The red spider is:
(1) An Aphid (2) A Beetle (3) A Mite (4) A Scale
20. When should spraying to control weeds in the nursery field be done?
(1) When the nursery plants have new, soft growth (2) When the nursery plants are active (3) When the nursery plants are young (4) When the nursery plants are dormant
21. Hoeing and cultivating is most effective for weed control during:
(1) Rainy weather (2) Hot, dry weather (3) Warm, humid weather (4) Cool weather
22. Lindane, Malathion, and Chlordane are:
(1) Weed killers (2) Fungicides (3) Insecticides (4) Fertilizers
23. Captan, Ferbam, and PCNB are:
(1) Weed killers (2) Fungicides (3) Insecticides (4) Fertilizers

Subtest 6

Soil and Soil Nutrition

1. A material with 48% - 50% potassium content is:
(1) Nitrate of soda (2) Wood ashes (3) Dolomite (4) Murate of potash
2. What material provides quick acting nitrogen for acid plants:
(1) Urea (2) Ammonia sulfate (3) Gypsum (4) Cottonseed meal
3. A material that makes phosphoric acid quickly available is:
(1) Dolomite (2) Ammonia sulfate (3) Superphosphate (4) Gypsum
4. What material adds calcium without changing soil pH?
(1) Dolomite (2) Urea (3) Cyanamid (4) Gypsum
5. The release of nutrients from decaying organic matter increases when the soil becomes:
(1) Dry and cold (2) Hard and dry (3) Dry and warm (4) Moist and warm
6. Bacterial action in soil increases most with the addition of:
(1) Inorganic fertilizer (2) Sterilizer (3) Organic matter (4) Sand
7. The color of the sub-soil that would normally have the best drainage is:
(1) Brown (2) Gray-blue (3) Red and yellow (4) Gray
8. A commercial product used in sterile propagating media is:
(1) Styrofoam (2) Oasis (3) Loam (4) Perlite or vermiculite
9. High pH means that the soil is:
(1) Neutral (2) Alkaline (3) Acid (4) Sour
10. For a fertilizer with a 10-5-10 chemical analysis, the number 5 stands for:
(1) Available phosphoric acid (2) Nitrogen (3) Potash (4) None of these
11. The depth of top soil required for a strong healthy lawn is:
(1) 1" - 2" (2) 2" - 4" (3) 4" - 6" (4) 8" - 10"
12. Humus and clay are alike in their ability to hold soil nutrients because they are both:
(1) Soil colloids (2) Soil components (3) Soil conditioners (4) Soil builders
13. Which plant grows best in alkaline soil:
(1) Sweet peas (2) Azaleas (3) Rhododendron (4) Hydrangea
14. Which element has little value as a plant food?
(1) Phosphorus (2) Nitrogen (3) Calcium (4) Aluminum

15. Where would you expect to find low soil pH as a general rule?
(1) All over the U. S. (2) Eastern U. S. (3) Southwestern U. S.
(4) Western U. S.
16. The order in which the chemical analysis of a bag of fertilizer is reported is:
(1) Phosphorus, nitrogen, potash (2) Phosphorus, potash, nitrogen
(3) Potash, nitrogen, phosphorus (4) Nitrogen, phosphorus, potash
17. The numerals on a bag of fertilizer report the chemical analysis of the contents:
(1) In percentages (2) In square feet (3) In cubic feet (4) In pounds
18. The cost of the fertilizer depends chiefly on its:
(1) Phosphorus content (2) Potassium content (3) Nitrogen content
(4) Calcium content
19. Steam sterilization of soil:
(1) Helps conserve moisture (2) conditions the soil (3) Makes plant food more readily available (4) Kills weeds and disease organisms
20. Peat moss is mixed into the soil primarily to:
(1) Supply fertilizer (2) Protect plants against freezing (3) Condition the soil (4) Control disease
21. The term growing media refers to:
(1) The location where plants grow (2) The climate (3) A planting mixture (4) Soil fertility
22. The symbols N-P-K refer to:
(1) The chemical analysis of fertilizer (2) A commercial insecticide
(3) A growing media (4) A trade association
23. Normally the minerals plants use for food are found in the soil in the form of:
(1) Pure elements (2) Living organisms (3) pH (4) Chemical compounds

Subtest 7

Safety

1. When an employee is seriously injured at work, what should be done?
(1) Report the injury to the employer (2) Report the injury to the Workmen's Compensation Board (3) See a doctor (4) All of these
2. Why should a gas mask be worn instead of a respirator when aerosol pesticide is used in a greenhouse or sash house?
(1) A respirator is heavy and clumsy to wear (2) A respirator does not protect the eyes (3) A respirator is difficult to clean and care for (4) A respirator can be safely used only out-of-doors
3. When spraying in an unventilated place, a person should always:
(1) Wear a respirator (2) Wear a gas mask (3) Wear goggles (4) None of these
4. The respirator part that must be changed most frequently is the:
(1) Cartridge (2) Canister (3) Filter (4) Mask
5. When a person runs a combustion engine indoors, safety requires that the place be:
(1) Well ventilated (2) Well heated (3) Air conditioned (4) Well illuminated
6. Most burns caused by chemicals should be treated immediately by:
(1) Rubbing with ointment (2) Bandaging tightly (3) Covering with ice (4) Washing with running water
7. DDT can be seriously dangerous to wildlife by causing:
(1) Water pollution (2) Soil pollution (3) Air pollution (4) None of these
8. Proper safety precautions always consider the health and safety of:
(1) People (2) Plant life (3) Wildlife (4) All of these
9. Who pays for Workmen's Compensation Insurance?
(1) The employees (2) The employers (3) The State (4) The labor unions
10. The largest number of accidents that occur to operators of machinery are a result of:
(1) Poor maintenance (2) Defective parts (3) Careless operation (4) Absence of safety devices

TEST IN
AGRICULTURAL MECHANIZATION

Cornell University
Department of Education

DIRECTIONS TO THE TEACHER

AGRICULTURAL MECHANIZATION

- 1) Read the Directions to the Students for the TEST IN AGRICULTURAL MECHANIZATION in advance, so you can answer student questions about their meaning if necessary.
- 2) Start by giving each student a sheet of the DIRECTIONS TO STUDENTS and one answer sheet. Have the students read the directions. Then have them write only their name and the school's name in the proper blanks on the answer sheet. The other blanks at the top of the answer sheet may be ignored. (Ignore the section labeled Identification Number on the answer sheets; they are for Cornell use.)
- 3) Call the students' attention to the fact that the items are numbered across the rows of the answer sheet, rather than down the columns. (This is important, since people tend not to notice the numbering, and begin to record responses down the first column.)
- 4) Distribute the test booklets, and have the students begin work.
- 5) Circulate through the room, and check each student's answer sheet. Be sure that each student is marking his answers properly on the answer sheets. (Neatly, heavily, and across the rows.)
- 6) Do not answer student questions about the content of test items. You should help students only to the extent of seeing that they follow directions.
- 7) There is no time limit for the test. Please enclose a note with your returns indicating the amount of time required for your fastest student and your slowest student to complete the test.
- 8) If a student spoils an answer sheet during the test, have him complete the test on the spoiled answer sheet. After he has completed the test, have him transfer his answers from the spoiled sheet to a fresh answer sheet. Extra sheets are provided for this purpose. Do not return spoiled answer sheets.
- 9) If unforeseen problems arise in administering the test, resolve them according to your best judgment. Please inform us of the circumstances of such difficulties when making your returns.

TEST IN AGRICULTURAL MECHANIZATION

DIRECTIONS:

Read all these directions before you begin to answer any questions.

On this test we want to find out some of the things you have learned in Agricultural Mechanization. You are not expected to be able to answer every question, so you should not worry if there are a number of questions that you cannot answer. Answer the questions you are able to answer, but do not spend a lot of time trying to answer things that are unfamiliar to you. When you are not sure of an answer, if you think you can make a pretty good guess at the correct answer, then go ahead and make a guess.

On this test you will mark your answers on a special answer sheet. ALL of your answers should be made on this answer sheet, which will be given to you by the teacher. DO NOT WRITE ANY ANSWERS IN THE TEST BOOKLETS.

This is how your answers should be marked on the special answer sheet:

(1) Read the question and decide which of the four possible answers is the best answer. If you think that a question has more than one correct answer, then you should pick the best answer to the question.

(2) Then find the item on the answer sheet that is numbered the same as the test question.

(3) Blacken with your pencil the space on that item that has the same number as the answer you have selected as correct.

EXAMPLE: Suppose question number one goes like this:

1. The color of John Deere tractors is:
(1) Red (2) Gray (3) Green (4) Orange

For question number 1 you would pick Green as your answer. You would then find item number 1 on the answer sheet. And because Green is answer number 3 on the first question, you would blacken space number 3 of the first item on the answer sheet.

Be sure to make your marks on the answer sheet heavy and dark. Make sure your mark completely fills the narrow space between the dotted lines. Do not get any stray pencil marks on other parts of the answer sheet. And if you have to change an answer, erase your first mark completely.

Write only your name and the name of your school in the proper blanks on the answer sheet.

1. When servicing any part of the electrical system of a gasoline engine:
(1) Disconnect spark plugs (2) Remove the distributor cap (3) Disconnect the battery's ground terminal (4) Disconnect the voltage regulator
2. What first-aid treatment should be given for severe electric shock?
(1) Make the victim lie down with head low (2) Keep the victim warm with blankets (3) Neither of these (4) Both of these
3. What first-aid treatment should be given to someone who feels the symptoms of carbon monoxide poisoning?
(1) Induce vomiting (2) Get him into the open air (3) Give him plenty of liquid (4) Give him aspirin
4. To operate a drill press safely the operator should always:
(1) Set the drill bit against the work-piece before starting the motor (2) Use a lubricant when drilling any metal (3) Keep the chuck key inserted in the chuck at all times (4) Clamp the work-piece to the drill table
5. To prevent spontaneous combustion, where should oily rags be kept?
(1) In the open air (2) In a covered metal container (3) In a fire-proof room (4) None of these
6. What pressurized gas reacts explosively when it comes in contact with grease or oil?
(1) CO₂ (2) Acetylene (3) Compressed Air (4) Oxygen
7. Where may gasoline be stored safely in a shop?
(1) Nowhere (2) In a cool place (3) In a fuel pump (4) In a ventilated container
8. What safety practice is necessary for operating all of the following safely in the shop: arc welder, paint sprayer, and gasoline engine?
(1) Use a respirator (2) Wear safety glasses (3) Ventilate the shop (4) None of these
9. What body posture is best for lifting heavy objects from the ground?
(1) Knees bent, back straight (2) Knees bent, back bent (3) Knees straight, back bent (4) None of these
10. Why is it unsafe to check a battery by shorting the terminals with a screwdriver?
(1) The battery will be discharged (2) The battery cells will break down (3) Electrolyte vapor is explosive (4) The terminals will be damaged.
11. The immediate first-aid treatment for acid burns is:
(1) Flushing the burn with water (2) Bandaging the burn with sterile gauze (3) Applying petroleum jelly (4) Calling a doctor

12. Who is required by law to pay the premiums on Workmen's Compensation Insurance?
(1) The employer (2) The worker (3) The labor union (4) The state
13. The amperage required to arc-weld mild steel 1/2 inch thick with a 5/32 inch electrode is:
(1) 140 amps (2) 90 amps (3) 60 amps (4) 180 amps
14. What type of lens is used in an arc-welder's mask to protect the eyes during welding?
(1) Clear safety glass (2) Plate glass (3) Filter glass (4) Window glass
15. What type of work gloves should be worn while arc welding?
(1) Cotton (2) Canvas (3) Leather (4) Any of these
16. The chemical coating on welding electrodes is called:
(1) Flux (2) Slag (3) Carbon (4) Core
17. The speed of travel in arc-welding depends on the:
(1) Rod size (2) Arc length (3) Amperage setting (4) Puddle of molten metal
18. The procedure used to run a wide bead in arc-welding is known as:
(1) Weaving (2) Whipping (3) Hardfacing (4) Overlaying
19. What is the easiest welding position to use?
(1) Flat (2) Upright (3) Vertical (4) Overhead
20. To weld two pieces of sheet metal into a single flat piece, what type weld is used?
(1) Edge (2) Fillet (3) Lap (4) Butt
21. Cast iron is preheated before welding to prevent:
(1) Spattering (2) Melting (3) Cracking (4) Overlapping
22. What type of flame is used for almost all acetylene welding?
(1) Oxidizing (2) Carburizing (3) Neutral (4) None of these
23. To turn off an oxyacetylene welding torch, which valve should be closed first?
(1) Oxygen torch-valve (2) Oxygen tank-valve (3) Acetylene tank-valve (4) Acetylene torch-valve
24. Bronze welding (brazing) with an oxyacetylene torch is usually used for:
(1) Fusing metals (2) Bonding metals (3) Hardsurfacing metals (4) Bronze plating
25. The normal heel clearance on a twist drill is about:
(1) 8° - 12° (2) 60° (3) 90° (4) 120° - 135°

26. The cutting edge of a twist drill is called the:
(1) Shank (2) Heel (3) Lip (4) Chuck
27. In lathe work, the instrument used to measure the accuracy of diameters is a:
(1) Micrometer (2) Straight edge (3) Protractor (4) Compass
28. The electrical pressure of an electric current is measured in:
(1) Watts (2) Volts (3) Amperes (4) Ohms
29. How many jaws does a universal lathe chuck have?
(1) 1 (2) 2 (3) 3 (4) 4
30. The instrument used to measure the horsepower developed by an engine is a:
(1) Dynamometer (2) Compression gauge (3) Hydrometer (4) Manometer
31. Practially all farm tractor engines are:
(1) Four cycle type (2) Diesels (3) Two cylinder type (4) Fuel injection type
32. The major cause of starting difficulties on an internal combustion engine is usually found in the:
(1) Ignition system (2) Fuel system (3) Lubrication system (4) Cooling system
33. What always results when timing is not set according to specifications?
(1) The engine refuses to start (2) Power output is reduced (3) The fuel mixture becomes too rich (4) Overheating
34. What engine system is probably at fault if the engine fails to fire when it is cranked?
(1) Compression system (2) Cooling system (3) Ignition system (4) Lubricating system
35. Resistance to the flow of electrical current is measured in:
(1) Volts (2) Ohms (3) Amperes (4) Watts
36. A transformer:
(1) Changes electric potential (2) Tests the amount of current
(3) Measures voltage (4) Checks resistance
37. Commutator brushes should be replaced:
(1) Every time the generator is serviced (2) Every 1000 hours of operation
(3) If the commutator is dirty (4) When they are worn to 1/2 their original length
38. For differential tractor brakes to be properly adjusted:
(1) The pedals should be locked together during adjustment (2) Pedals should touch the foot plate when depressed (3) The pedals should be even when depressed (4) The left wheel should develop more drag than the right wheel.

39. If sparks will jump from the tip of the spark plug wire to the engine, the source of an ignition problem is most likely in the:
(1) distributor (2) generator (3) spark plugs (4) battery
40. Improper valve clearance is often corrected by:
(1) Adjusting the tappets (2) Replacing the cams (3) Grinding the valve stems (4) Reboring the cylinder
41. What may result from poorly seated engine valves?
(1) Poor compression (2) Backfiring (3) Loss of power (4) All of these
42. In an internal combustion engine the explosion occurs in the:
(1) Compression chamber (2) Cylinder (3) Manifold (4) Valve
43. Soft water is preferred to well water in the tractor cooling system because:
(1) Well water boils at a lower temperature than soft water (2) Well water has lower density than soft water (3) A hydrometer cannot be used on well water (4) Minerals condensed from well water may plug the radiator
44. The viscosity of oil refers to its
(1) Color (2) Quality (3) Weight (4) Volume
45. How does crankcase oil protect the tractor and aid its performance?
(1) By reducing friction (2) By cooling hot parts (3) By creating a compression seal (4) All of these
46. How would you classify the weight of transmission oil compared to crankcase oil?
(1) Very light (2) Light (3) Medium (4) Heavy
47. What part of the tractor clutch assembly is most likely to wear excessively?
(1) The driving plate (2) The facing (3) The flywheel (4) The adjusting plate
48. On L-P Gas tractors, fuel is vaporized for combustion in the
(1) Converter (2) Carburetor (3) Fuel injector (4) Combustion chamber
49. A type of L-P Gas is
(1) Gasoline (2) Propane (3) Distillate (4) Diesel oil
50. What is one advantage of a Diesel tractor over a gasoline tractor?
(1) It is less expensive to purchase (2) Replacement parts are less expensive (3) Operation is less expensive (4) All of these
51. The gap on a spark plug is adjusted by bending:
(1) The center electrode (2) The outer electrode (3) Both electrodes (4) Neither electrode

52. To check engine compression, the compression gauge is mounted on the:
(1) Spark plug holes (2) Valve seat (3) Valve guide (4) Cylinder
53. To tighten cylinder head bolts and spark plugs properly, the mechanic should use a:
(1) Boxed end wrench (2) Crescent wrench (3) Torque wrench (4) Socket wrench
54. The cylinder bore gauge measures:
(1) Cylinder circumference (2) Cylinder diameter (3) Cylinder depth
(4) Cylinder pressure
55. What type of transmission is most widely used on farm tractors?
(1) Friction transmission (2) Planetary transmission (3) Automatic transmission (4) Sliding gear transmission
56. A low specific gravity reading on a hydrometer means that the battery:
(1) Should be recharged (2) Needs water (3) Is overcharging (4) Is in good working condition
57. If poor compression is restored to normal by squirting a little oil on the cylinder wall, what is probably the cause of the compression trouble?
(1) The intake valve (2) The piston rings (3) The exhaust valve
(4) None of these
58. The voltage of each cell of a 12 volt storage battery should be about:
(1) 12 volts (2) 6 volts (3) 4 volts (4) 2 volts
59. What should not be done when checking the breaker points?
(1) File contact surfaces (2) Check, clean, and tighten condenser connections (3) Check and adjust the gap (4) Lubricate contact points with light oil
60. If the tractor's sediment bowl does not fill completely after proper cleaning, it is necessary to:
(1) Replace the sediment bowl (2) Replace the filter (3) Bleed air from the fuel line (4) Clean the fuel line
61. If the carburetor is adjusted to give too lean a mixture, what is likely to result?
(1) Black exhaust smoke (2) Backfiring in the carburetor (3) Excess fuel consumption (4) Fouling of spark plugs
62. Adjustment of the tractor carburetor for high speeds or full loads is controlled by the:
(1) Main adjusting needle (2) Idling mixture screw (3) Idling speed screw (4) Venturi
63. The number one cylinder in a four cylinder engine is the cylinder nearest to the:
(1) Distributor (2) Flywheel (3) Carburetor (4) Radiator

64. What instrument will check a spark plug gap accurately?
 (1) Caliper (2) Round wire gauge (3) Micrometer (4) Feeler gauge
65. To align bolt holes when assembling machinery, the proper tool to use is a:
 (1) Drift pin (2) Easy-out (3) Screw driver (4) Center punch
66. The greatest difference in the design of gasoline and diesel engines is in the:
 (1) Cooling system (2) Transmission system (3) Lubrication system
 (4) Ignition system
67. The proper temperature range for coolants in a gasoline engine is:
 (1) 100° - 120° (2) 135° - 155° (3) 165° - 190° (4) 190° - 210°
68. How does outside temperature affect the cranking power available from a tractor battery?
 (1) Maximum power is available at about 50°F (2) Maximum power is available at about 32°F (3) Temperature does not affect cranking power (4) Greater power is available as temperature increases
69. Ignition spark occurs when:
 (1) The breaker points open (2) The breaker points close (3) The condenser becomes charged (4) The coil heats up
70. The current in the secondary circuit of a magneto:
 (1) Is induced by the collapsing field of the primary winding (2) Is induced by the condenser (3) Comes from the breaker points (4) Comes directly from the battery
71. The normal operating speed of the starting motor of a gasoline engine is:
 (1) 300-400 rpm (2) 600-1000 rpm (3) 1500-2000 rpm (4) 280-300 rpm
72. Horsepower developed by the tractor engine operating under working conditions in the field is called:
 (1) Indicated horsepower (2) Brake horsepower (3) Drawbar horsepower (4) Rated horsepower
73. The venturi is designed to:
 (1) Control the air-to-fuel ratio (2) Control idling speed (3) Increase air velocity (4) Regulate fuel level in the float bowl.
74. If a driving gear with 14 teeth is travelling 360 rpm, a driven sprocket with 28 teeth is going at:
 (1) 120 rpm (2) 180 rpm (3) 360 rpm (4) 720 rpm
75. If a large diameter driving gear is replaced with a small diameter gear, what happens to the rpm of the driving gear?
 (1) rpm increase (2) rpm decrease (3) rpm remain the same (4) It is impossible to decide

76. In a four cycle gasoline engine, ignition occurs near the end of the:
(1) Intake stroke (2) Compression stroke (3) Power stroke (4) Exhaust stroke
77. The simplest useful method of lowering compression ratio is to:
(1) Install a thicker head gasket (2) Grind down the piston face
(3) Mill the gasket face (4) Install longer connecting rods
78. The rear main bearing of a one cylinder gasoline engine is always next to the:
(1) Starter sheave (2) Drive shaft (3) Fuel pump (4) Fly wheel
79. Engine vibrations come chiefly from forces exerted by:
(1) Reciprocating parts (2) Rotating parts (3) Balance weights
(4) Stationary parts
80. The camshaft and crankshaft rotate in opposite directions when:
(1) The camshaft gear meshes with the crankshaft gear (2) The camshaft is chain driven (3) The camshaft is overhead (4) The engine is an overhead valve type
81. What material is almost exclusively used today in the composition of engine pistons?
(1) Cast iron (2) Stainless steel (3) Aluminum (4) High carbon steel
82. The top ring of an engine piston is the:
(1) Oil ring (2) Compression ring (3) Scraper ring (4) Slipper ring
83. Wrist pins should be removed and installed with a(n):
(1) Press (2) Drill (3) Hammer and drift pin (4) Easy-out
84. An exhaust port in the cylinder wall is often used instead of poppet exhaust valves on:
(1) Two cylinder engines (4) Four cylinder engines (3) Four cycle engines (4) Two cycle engines
85. An engine with an overhead camshaft does not usually have:
(1) Valve springs (2) Retainers (3) Tappets (4) Valve guides
86. How are the working parts of a two cycle engine lubricated?
(1) By oil splashed from the reservoir by the crankshaft (2) With oil circulated by a pump (3) By engine oil mixed with the fuel (4) By all three methods
87. The oil additive that slows down the deterioration of oil is known as a(n):
(1) Inhibitor (2) Pour-point depressant (3) Detergent (4) Dispersive
88. The engine speed of a diesel engine is adjusted by regulating the:
(1) Throttle valve (2) Compression ratio (3) Amount of fuel injected
(4) Timing

89. Which of the following troubles can the proper use of a vacuum gauge help to detect?
(1) Slow ignition timing (2) Leaks in cylinders, intake manifold, or carburetor (3) Poor valve operation (4) All of these
90. The first task that should be performed in tuning-up a small gas engine is:
(1) A compression check (2) Carburetor adjustment (3) Spark plug gap adjustment (4) Valve clearance check
91. The last step in small engine tune-up is:
(1) A Compression check (2) Carburetor adjustment (3) Spark plug gap adjustment (4) Valve clearance check
92. When a damaged cylinder wall is repaired by reboring the cylinder:
(1) The original pistons are reinstalled (2) The original pistons are expanded and reinstalled (3) The original pistons are fitted with oversize rings (4) Oversize pistons must be installed.
93. On carburetors that have only one adjustment, the adjusting valve regulates the:
(1) Throttle (2) Choke (3) Speed (4) Mixture
94. On shunt-type generators, what prevents the battery from being over-charged at high operating speeds?
(1) The voltage regulator (2) The third brush (3) The commutator (4) Resistance in the field coil
95. The high voltage current in a battery ignition system is produced when:
(1) The magnetic field around the coil collapses (2) The charge in the ignition condenser is large enough (3) An arc occurs across the breaker points (4) The resistance in the primary coil is lowered
96. In charging a storage battery:
(1) The positive lead is attached to the positive battery terminal
(2) Alternating current is used (3) The rate of charge is always 1 amp
(4) Battery temperature should reach about 120°F
97. A compression leak between the cylinder and piston is called:
(1) By-pass (2) Blow-by (3) Backlash (4) Backfire
98. A device for temporarily storing electrical current in the ignition system is called a:
(1) Resistor (2) Transistor (3) Condenser (4) Conductor
99. If a magneto is sparking excessively across the breaker points, the trouble is probably caused by:
(1) A defective condenser (2) Weak magnets (3) Worn breaker points
(4) Worn out spark plugs
100. Which of these diesel engine parts is the most delicate and easy to damage?
(1) Fuel injector (2) Generator (3) Radiator (4) Piston

101. Horsepower measures:
(1) Mechanical work (2) Rate of speed (3) Electrical energy (4) Physical pressure
102. Carburetor adjustment on a small gas engine should be started by opening the carburetor jet:
(1) 1/2 turn (2) 1-1/2 turns (3) 2-1/2 turns (4) 3-1/2 turns
103. Plastigage may be used to check:
(1) Ring clearance (2) Connecting rod bearing clearance (3) Valve clearance (4) Wrist pin clearance
104. When plugs and points are replaced on a tractor, what else is usually replaced also?
(1) Distributor cap (2) Condenser (3) Rotor (4) Coil
105. Engine main bearings should be tightened with a:
(1) Torque wrench (2) Boxed end wrench (3) Socket wrench (4) Crescent wrench
106. Centrifugal force plays an important part in the operation of the
(1) Carburetor (2) Fuel pump (3) Governor (4) Fuel injectors
107. What can cause defective governor operation?
(1) Worn parts (2) Binding linkage (3) Loss of spring tension (4) All of these
108. Why is a primer paint usually applied to a metal surface before the finish coat?
(1) Only to inhibit rust (2) To inhibit rust and condition the surface (3) Only to condition the surface (4) None of these
109. To prevent excessive wear of plowshare cutting surfaces:
(1) Keep the blade edge ground knife-sharp (2) Set the colter at the greatest possible cutting depth (3) Hardface the cutting edges (4) Increase the draft
110. To increase the depth of cut on a disk harrow, the operator normally does what?
(1) Adjust the angle of the blades (2) Add weights (3) Increase draft (4) Lower the drawbar
111. What type of drive chain must be used on sprockets that move in forward and reverse directions?
(1) Pintle chain (2) Roller chain (3) Conveyor chain (4) Detachable link chain
112. The front conveyor sprockets on a manure spreader:
(1) Drive the conveyor chain (2) Drive the beaters (3) Guide the conveyor chain (4) Drive the widespread

113. The purpose of the cylinder-beater on a combine is to:
(1) Guide straw and grain from the beater to the threshing unit
(2) Carry grain to the elevator (3) Winnow the chaff from the grain
(4) Separate the grain from the straw
114. On grain drills the type of furrow opener recommended for trashy conditions is the:
(1) Disk type (2) Hoe type (3) Runner type (4) Shoe type
115. What major advantage do hydraulic power systems have?
(1) Few external moving parts (2) Strong positive action (3) Remote control (4) All of these
116. Which of the following is not an example of positive drive?
(1) Gear assembly (2) Chain drive (3) Friction clutch (4) PTO shaft
117. On what piece of harvesting equipment is the tailings auger found?
(1) Baler (2) Forage harvester (3) Cornpicker (4) Combine
118. The standard PTO speed on new tractors is:
(1) 500 rpm (2) 1000 rpm (3) 1500 rpm (4) 2000 rpm
119. Irregular spacing within the rows of a corn crop is most frequently due to:
(1) Use of a damaged or wrong size seed plate (2) Planting at slow tractor speeds (3) Using the wrong sprocket combination (4) Improper adjustment of planter runners
120. What can be done to remedy cracked grain in combining?
(1) Decrease beater speed (2) Decrease PTO speed (3) Lower the concaves (4) Adjust cylinder speed and clearance
121. What mechanical defect may result in untied bales?
(1) Worn bill hook (2) Worn twine disk (3) Both of these (4) Neither of these
122. To replace knife sections properly on a mower they should be attached to the knife bar with:
(1) Bolts (2) Sheet metal screws (3) Spot welds (4) Rivets
123. On a baler, the twine is delivered to the knotter by the:
(1) Twine disks (2) Bill hooks (3) Needles (4) Twine holders
124. What type of rollers on hay conditioners give the greatest crimping action?
(1) Flat steel (2) Rubber (3) Corrugated metal (4) None of these
125. Centering mower knives under the guards at the end of the knife stroke insures correct:
(1) Alignment (2) Register (3) Lag (4) Lead
126. The best type of motor to use on an appliance that has a heavy starting load is:
(1) Split phase (2) Capacitor (3) Repulsion-Induction (4) Universal

APPENDIX B

Section II

**Questionnaires
and
Survey Instruments**

CORNELL UNIVERSITY

Division of Agricultural Education
Department of Education

TEACHER QUESTIONNAIRE BOOKLET

Teacher's Name: _____

School: _____

Location: _____

CORNELL UNIVERSITY
TEACHER QUESTIONNAIRES

Introduction

Please be sure that your Name, School, and school location are correctly filled out on the preceding page. Check this now.

This booklet contains three questionnaires: A, B, and C. Please complete all three according to the directions given with each questionnaire.

On the questionnaires you are asked to respond to items concerning Directed Work-Experience for high school students. To avoid confusion about the meaning of "directed work-experience" please read carefully the general description given below. Whenever you encounter the term "directed work-experience" in questionnaire items, it refers to the kind of program and activities described below.

Directed Work-Experience Programs

A directed work-experience program is a regular part of the high school's vocational education program. It is regulated by the school authorities, and it is operated by the vocational teacher with the help of cooperating employers. The purpose of directed work-experience is to give the vocational students an opportunity:

1. To practice on a real job the knowledge and skills they learn in school;
2. To increase their knowledge and job skills by working for an employer who is interested in helping the student to learn the job better; and
3. To develop good work habits and attitudes through practice acquired during high school years.

In a directed work-experience program, the teachers and employers cooperate in planning a program that will help the student prepare for the occupation he wishes to pursue. They decide together what needs to be taught in school in order to make the student's job experience a success. They decide together what the student needs to learn from job experience and how that learning can be accomplished on the job. And finally, they cooperate closely in putting these plans to work by giving the student a well-rounded program of school instruction, on-the-job instruction, and useful job experience.

PLEASE TURN THE PAGE, READ THE DIRECTIONS,
AND COMPLETE THE QUESTIONNAIRES

Cornell University

TEACHER QUESTIONNAIRE A

DIRECTIONS: Answer the questions below by placing a check (✓) in the YES or the NO column for EACH question. Each question refers to an activity or objective you may have incorporated in your Directed Work-Experience Program.

- 1) Check YES if you actually incorporated the activity or objective into your program.
- 2) Check NO if you did not actually incorporate the activity or objective into your program.

If you are unable to answer YES to every part of a question, you should respond NO to that question.

Yes No

- | | | |
|---|---|--|
| — | — | 1. Did your vocational program develop specific marketable skills and knowledge required for particular jobs in off-farm agricultural occupations? |
| — | — | 2. Did your vocational program provide work-experiences that were accompanied by a noticeable improvement of student work habits? |
| — | — | 3. Did you admit to your vocational program only students who were interested in a career in the occupations for which the program prepares them? |
| — | — | 4. Did you arrange with local employers to place students in commercial settings for directed work-experience? |
| — | — | 5. Did you arrange for students to obtain <u>remunerated employment for directed work-experience in a business setting?</u> |
| — | — | 6. Did you arrange student employment in a commercial setting that provided work-experience <u>directly related to the vocational curriculum?</u> |
| — | — | 7. Did you arrange for students to have an extended period of directed work-experience? |
| — | — | 8. Did you personally take steps to inform and solicit the interest of the general student body in a directed work-experience program? |
| — | — | 9. Did you seek the active support of the school administration in planning and operating a directed work-experience program? |

YES NO

- — 10. Did you work closely with the school guidance personnel with regard to such matters as the referral, selection, and scheduling of vocational students for directed work-experience?
- — 11. Did you use the school's formal channels of communication to promote the interest and cooperation of the general faculty?
- — 12. In planning and establishing a directed work-experience program, did you personally inform parents about the program and solicit their cooperation?
- — 13. In planning the directed work-experience program, did you personally contact and seek assistance from members of the agricultural business community?
- — 14. Have you used the services of an advisory committee composed of local agricultural businessmen to help initiate a directed work-experience program?
- — 15. Have you personally made use of public communications media to bring directed work-experience to public attention?
- — 16. Have you solicited the suggestions of an advisory board of employers to help develop your course of study?
- — 17. Have you discussed with your advisory board the competencies that students should develop before placement?
- — 18. Has your advisory board advised you on the appropriateness of placing students in specific businesses?
- — 19. Has your advisory board assisted you with advice on methods of establishing public interest and support for the directed work-experience program.
- — 20. Has your advisory board advised you in your dealings and negotiations with employers?
- — 21. Before placing any student with an employer, have you reached an understanding with the employer about the specific type of work to be provided?
- — 22. Was each student who was to be placed for work-experience interviewed and hired directly by the employer?
- — 23. In each instance of placement on work-experience, were the terms of employment recorded and agreed upon by the employer, student, teacher, and parent?

YES NO

- — 24. Were students fully informed by employers of their duties and the conditions of employment before work-experience began?
- — 25. Did employers provide the teacher with periodic progress and performance reports on students engaged in work-experience?
- — 26. Did employers make definite effort to provide students on work-experience with instruction in a variety of necessary job skills?
- — 27. Did you include general occupational information and orientation to employment in your course of study?
- — 28. Did class periods in school include group discussion of problems and experiences that students encountered on the job?
- — 29. Did you adjust the content and sequence of class and shop instruction to accommodate specific demands made on students by their work?
- — 30. Did you evaluate the specific conditions of each student's job and individualize safety instruction to meet the safety requirements of each job?
- — 31. Did each of your students maintain a personal record of wages, time worked, and job assignments?
- — 32. Did the majority of students placed for work-experience work in commercial, off-farm agricultural settings?
- — 33. Did your school grant extra credit toward graduation for completion of directed work-experience requirements?
- — 34. Did you make regularly scheduled coordination visits to employers and students on the job?
- — 35. Did you utilize the testing or counseling services of the Employment Service?
- — 36. Did you make periodic progress reports to the school administration of accomplishments of your program?
- — 37. Have you conducted a systematic evaluation of your program's effectiveness through follow-up of students?

YES NO

- — 38. Have you systematically evaluated your curriculum by surveying employer and student opinion?
- — 39. Were student class schedules arranged to facilitate the participation of vocational students in directed work-experience?

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TEACHER QUESTIONNAIRE B

DIRECTIONS: Each item below concerns directed work-experience as part of a high school's vocational program. Read each item carefully and decide whether you agree or disagree with the statement. Answer the items as follows:

- 1) If you agree with a statement, place a check (✓) in column one (I) next to that item.
- 2) If you disagree with the statement, place a check (✓) in column two (II) next to that item.

If you disagree with any part of an item, your answer should be DISAGREE. Be sure to answer every item; do not omit any items; make only one check (✓) per item.

Column
I II

- | | | |
|---|---|---|
| — | — | 1. It is important for the vocational program to develop the <u>specific</u> marketable skills and knowledge required for <u>particular</u> jobs. |
| — | — | 2. It is important for directed work-experience to emphasize the development and improvement of work habits. |
| — | — | 3. It is important to admit students to directed work-experience only if they are interested in a career in an occupation for which training is provided. |
| — | — | 4. It is important for students to obtain directed work-experience and training in out-of-school commercial settings. |
| — | — | 5. It is important that students participating in a directed work-experience program be paid wages for the work performed. |
| — | — | 6. It is important to provide directed work-experience closely related to the vocational curriculum. |
| — | — | 7. It is important for the placement of students on work-experience to be of extended duration. |
| — | — | 8. It is important to disseminate information about the program and bring its activities to the attention of the whole student body. |
| — | — | 9. It is important to obtain the active support of school administrators in planning and operating the program. |

Column	
I	II

- | | | |
|---|---|--|
| — | — | 10. It is important to work closely with guidance personnel in such matters as the referral, selection, and scheduling of vocational students. |
| — | — | 11. It is important to keep the whole faculty of the school informed about developments and activities in the program. |
| — | — | 12. It is important to obtain the active support and cooperation of parents in planning and conducting a directed work-experience program. |
| — | — | 13. It is important to involve local agricultural businessmen in plans to organize a directed work-experience program. |
| — | — | 14. It is important to form a committee of local employers to advise on the content and organization of a directed work-experience program. |
| — | — | 15. It is important to publicize the program widely in the community. |
| — | — | 16. It is important for the advisory committee to contribute substantially to the development of the directed work-experience program's course of study. |
| — | — | 17. It is important for the advisory committee to counsel the teacher on the competencies that students should develop prior to placement. |
| — | — | 18. It is important for the advisory committee to advise the teacher on the appropriateness of placement opportunities. |
| — | — | 19. It is important for the advisory committee to help the vocational teacher plan a public relations program. |
| — | — | 20. It is important for the advisory committee to counsel the vocational teacher in his dealings with employers. |
| — | — | 21. It is important for the teacher and the employer to reach an understanding about the kind of work to be provided before a student is placed for work-experience. |
| — | — | 22. It is important for the employer himself to interview and hire the student who is to receive directed work-experience. |
| — | — | 23. It is important for the employer to inform the student fully about the duties and conditions of employment before directed work-experience begins. |

Column	
I	II

- | | | |
|---|---|--|
| — | — | 24. It is important for the terms of employment to be recorded in each instance and consented to by the student, employer, teacher, and parents. |
| — | — | 25. It is important for employers to provide the teacher with periodic progress and performance reports on students receiving work-experience. |
| — | — | 26. It is important that employers provide students with instruction and experience in a variety of relevant job tasks. |
| — | — | 27. It is important for the course of study to include general occupational information and orientation to employment. |
| — | — | 28. It is important to reserve portions of class time for group discussion of problems and experiences encountered by students at work. |
| — | — | 29. It is important to adjust content and sequence of class instruction to accommodate specific demands made upon students by their work. |
| — | — | 30. It is important to individualize safety instruction in school to meet the safety requirements of each student's job. |
| — | — | 31. It is important for each student to keep a personal record of wages, hours, and job assignments. |
| — | — | 32. It is important to place students for work-experience whenever possible in off-farm agricultural businesses or industries. |
| — | — | 33. It is important for the school to grant extra credit toward graduation for completion of work-experience requirements. |
| — | — | 34. It is important for the teacher to make regularly scheduled coordination visits to employers and to students at work. |
| — | — | 35. It is important to use the testing and counseling services of the State Employment Service. |
| — | — | 36. It is important to make periodic reports to the school administration on the accomplishments of the experience program. |
| — | — | 37. It is important to conduct a systematic follow-up of students in order to evaluate the program's effectiveness. |

<u>Column</u>	
<u>I</u>	<u>II</u>

- | | | |
|---|---|---|
| — | — | 38. It is important to evaluate the usefulness of the curriculum content through a systematic survey of employers and students. |
| — | — | 39. It is important to arrange class schedules to facilitate participation of vocational students in directed work-experience. |

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TEACHER QUESTIONNAIRE C

GENERAL DIRECTIONS: Each section below contains a number of items pertaining to directed work-experience programs coordinated by high school vocational teachers. Your task is to rank the items contained in each section. Rank them according to your opinion of their importance to the success and effectiveness of a directed work-experience program.

If you have coordinated such a program, base your judgments as much as possible on your own personal experience. If you have not coordinated such a program, base your judgments on your opinions about the importance of the items.

Finish each section completely before you go on to the next section.

SECTION I

Directions: Read the items in this section carefully. Then rank the items from 1-7. Decide which item you consider most important to the success and effectiveness of a directed work-experience program and write the number one (1) in the blank beside that item. Write the number two (2) in the blank beside the item you judge to be second in importance, etc. Continue in this way until you have assigned a rank of 1, 2, 3, 4, 5, 6, or 7 for each of the seven items in this section. Be sure to assign each item a rank; and do not rank any two items alike. Proceed to Section II only when all items in Section I have been completed.

RANK

- ___ a) A directed work-experience program cultivates the development of marketable skills and knowledge required for specific jobs.
- ___ b) Directed work-experience concentrates on the development and improvement of work habits.
- ___ c) Directed work-experience is restricted to students with career aspirations in an occupation for which training is provided in the program.
- ___ d) Students obtain directed work-experience in out-of-school, commercial settings.
- ___ e) Students who receive directed work-experience are paid wages for work performed.
- ___ f) Directed work-experience provides job training closely related to the vocational curriculum
- ___ g) The placement of students for directed work-experience is of extended duration.

SECTION II

Directions: Read all eight items in Section II carefully. Rank the items from one (1) to eight (8) according to their importance to the success and effectiveness of an on-the-job training program. Record your responses in the blank spaces beside the items.

RANK

- ___ a) The vocational teacher ensures that the directed work-experience program and its activities are brought to the attention of the whole student body.
- ___ b) The school administration is encouraged to give active support to the directed work-experience program.
- ___ c) The vocational teacher works closely with guidance personnel on matters like the referral, selection, and scheduling of vocational students.
- ___ d) The vocational teacher keeps the whole faculty informed about developments and activities in the work-experience program.
- ___ e) The vocational teacher maintains personal contacts with parents, keeping them informed about the program and soliciting their cooperation.
- ___ f) The vocational teacher seeks the assistance of local agricultural businessmen in planning and organizing the directed work-experience program.
- ___ g) A formal committee of local employers is formed to advise the vocational teacher on the organization and development of the directed work-experience program.
- ___ h) The directed work-experience program is widely publicized in the community.

SECTION III

Directions: Read carefully and rank the five items in Section III, from 1-5 according to their importance to the success and effectiveness of a directed work-experience program. Record your responses in the blanks beside the items.

RANK

- ___ a) The advisory committee of local employers contributes substantially to the development of the program's course of study.
- ___ b) The advisory committee counsels the teacher about the competencies students should develop before placement for work-experience.

RANK

- _____ c) The advisory committee advises the vocational teacher on the appropriateness of specific placement opportunities.
- _____ d) The advisory committee advises the vocational teacher on ways to arouse public interest and support for the work-experience program.
- _____ e) The advisory committee counsels the vocational teacher in his dealings with employers.

SECTION IV

Directions: Read carefully and rank the six (6) items in this section from one (1) to six (6) according to their importance to the success and effectiveness of a directed work-experience program. Record your responses as in previous sections.

RANK

- _____ a) Before a student is placed with an employer, the teacher and employer come to an understanding about the kind of work-experience to be provided.
- _____ b) Students to be placed on directed work-experience are interviewed and hired directly by the employer.
- _____ c) Terms of employment are recorded and agreed upon by the student, employer, teacher, and parents before the student begins work.
- _____ d) The employer informs the student fully about the duties and conditions of employment before the student starts work.
- _____ e) Employers report to teachers periodically on the progress and performance of students engaged in directed work-experience.
- _____ f) Employers provide students with instruction and experience in a variety of relevant job tasks.

SECTION V

Directions: Read carefully and rank the seven (7) items in this section from 1-7 according to their importance for the success and effectiveness of a directed work-experience program. Record your responses in the blanks beside the items.

RANK

- _____ a) The course of study incorporates general occupational information and orientation to employment.
- _____ b) Portions of class time are reserved for group discussion of problems and experiences encountered by students at work.

RANK

- ___ c) The vocational teacher adjusts the content and sequence of instruction in school to accommodate specific demands made upon students at work.
- ___ d) Safety instruction in school is individualized to meet the safety requirements of each student's job.
- ___ e) Each student maintains and submits to the teacher a personal record of his wages, hours, and job assignments.
- ___ f) Students are placed for work-experience whenever possible in off-farm agricultural businesses and industries.
- ___ g) The school grants extra credit toward graduation for completion of minimum work-experience requirements.

SECTION VI

Directions: Read carefully and rank the six (6) items in this section from 1-6 according to their importance to the success and effectiveness of a directed work-experience program. Record your responses in the blanks beside the items.

RANK

- ___ a) The vocational teacher makes regularly scheduled coordination visits to employers and students on the job.
- ___ b) The teacher utilizes the counseling or testing services of his State Employment Service.
- ___ c) The vocational teacher periodically reports to the school administrators on the progress of the directed work-experience program.
- ___ d) The teacher conducts a systematic follow-up of students to evaluate his program's effectiveness.
- ___ e) The teacher systematically evaluates his course of study by surveying student and employer opinion.
- ___ f) The teacher makes advance arrangements to insure that student class schedules and the demand of directed work-experience will not conflict.

CORNELL UNIVERSITY
Division of Agricultural Education
Department of Education

EMPLOYER QUESTIONNAIRE BOOKLET

Employer's Name: _____
Name of Business: _____
Business Location: _____
Name of Student(s): _____

CORNELL UNIVERSITY

EMPLOYER QUESTIONNAIRE

Introduction

Please be sure that the following information has been correctly completed on the preceding page: a) your name, b) the name of your business, c) your business address, and d) the name of the school attended by the student(s) to whom you provided directed work-experience.

This booklet contains three questionnaires: A, B and C. Please complete all three according to the directions given with each questionnaire.

On the questionnaires you are asked to respond to items concerning Directed Work-Experience for high school students. To avoid confusion about the meaning of "directed work-experience" please read carefully the general description given below. Whenever you encounter the term "directed work-experience" in questionnaire items, it refers to the kind of program and activities described below.

Directed Work-Experience Programs

A directed work-experience program is a regular part of the high school's vocational education program. It is regulated by the school authorities, and it is operated by the vocational teacher with the help of cooperating employers. The purpose of directed work-experience is to give the vocational students an opportunity:

1. To practice on a real job the knowledge and skills they learn in school.
2. To increase their knowledge and job skills by working for an employer who is interested in helping the student to learn the job better.
3. To develop good work habits and attitudes through practice acquired during high school years.

In a directed work-experience program, the teachers and employers cooperate in planning a program that will help the student prepare for the occupation he wishes to pursue. They decide together what needs to be taught in school in order to make the student's job experience a success. They decide together what the student needs to learn from job experience and how that learning can be accomplished on the job. And finally, they cooperate closely in putting these plans to work by giving the student a well-rounded program of school instruction, on-the-job instruction, and useful job experience.

PLEASE TURN THE PAGE, READ THE DIRECTIONS,
AND COMPLETE THE QUESTIONNAIRES

Cornell University

EMPLOYER QUESTIONNAIRE A

DIRECTIONS: Answer the questions below by placing a check (✓) in the YES column or in the NO column.

- 1) Check YES if everything included in the question actually did occur.
- 2) Check NO if everything included in the question did not actually occur. Check NO if only some of the things included in the question occurred.

YES NO

- | | | |
|---|---|---|
| — | — | 1. Did you employ one or more students and provide them with opportunities to learn the kind of skills needed to get a regular job in your business? |
| — | — | 2. Did you observe a noticeable improvement in the work habits of students in your employ? |
| — | — | 3. Did students working for you on directed work-experience intend to find permanent jobs in a business like yours after they graduated from high school? |
| — | — | 4. Did the vocational teacher arrange with you for the hiring of students for directed work-experience in your business? |
| — | — | 5. Did you pay the minimum federal wage to students you hired for directed work-experience? |
| — | — | 6. Did you provide students with directed work-experience closely connected to the vocational courses taught in the school? |
| — | — | 7. Did students who worked for you stay on the job long enough to learn to do a variety of job assignments? |
| — | — | 8. Were you a member of an advisory committee that was formed to help the teacher plan and conduct a directed work-experience program? |
| — | — | 9. Did the vocational teacher seek your assistance in planning the work-experience program and its policies? |
| — | — | 10. Has the vocational teacher sought your advice concerning what is to be taught in the school's vocational courses? |

YES NO

- | | | | |
|---|---|-----|---|
| — | — | 11. | Were you consulted for advice in deciding what students need to learn before they are placed in jobs for directed work-experience? |
| — | — | 12. | Did you advise the vocational teacher concerning the appropriateness of placing students with other employers for work-experience? |
| — | — | 13. | Has the vocational teacher sought your advice about publicizing the work-experience program in your community? |
| — | — | 14. | Were you asked to help evaluate the success and effectiveness of the directed work-experience program? |
| — | — | 15. | Before a student was placed with your firm for work-experience, did you come to an understanding with the vocational teacher on the kind of experience you would provide? |
| — | — | 16. | Did you make the final decision about hiring a student for directed work-experience after interviewing him for the job? |
| — | — | 17. | Before a student began working for you, was he fully informed of his duties and other conditions of employment? |
| — | — | 18. | Did the vocational teacher visit you and the student regularly at your place of business? |
| — | — | 19. | Before a student began work-experience in your firm, did the school give him adequate safety instruction? |
| — | — | 20. | Before a student entered your employ for work-experience, were the terms of employment recorded and agreed to by you, the student, a parent, and the teacher? |
| — | — | 21. | Did you make regular reports to the vocational teacher concerning the quality of the student's work and his progress? |

Cornell University

EMPLOYER QUESTIONNAIRE B

DIRECTIONS: Each item below concerns directed work-experience as part of the vocational program of the high school. Read each item carefully and decide whether you agree or disagree with the statement. Record your answers as follows:

- a) If you agree with the statement made in an item, place a check (✓) in column one (I) next to the item.
- b) If you disagree with the statement made in an item, place a check (✓) in column two (II) next to the item.

If you disagree with any part of an item, your answer should be DISAGREE. Be sure to answer every item; do not omit any items; make only one check (✓) per item.

<u>Column</u>		
<u>I</u>	<u>II</u>	
—	—	1. It is important for students in directed work-experience to learn the skills needed for a particular job.
—	—	2. It is important for directed work-experience to emphasize the improvement of students' work habits.
—	—	3. It is important to restrict directed work-experience to students interested in careers in the kind of occupations in which work-experience is given.
—	—	4. It is important for vocational students to have on-the-job experience in real jobs as part of their high school program.
—	—	5. It is important for the employer to pay wages to students engaged in directed work-experience.
—	—	6. It is important for the employer to provide students with work experiences that require the student to use and improve the skills learned in school.
—	—	7. It is important for directed work-experience to last long enough to enable the student to learn to do a variety of job assignments.
—	—	8. It is important for the vocational teacher to establish an advisory committee of employers to help plan and conduct the work-experience program.

Column	
I	II

- | | | |
|---|---|---|
| — | — | 9. It is important for the advisory committee of employers to help in planning the work-experience program and its policies. |
| — | — | 10. It is important for employers on the advisory committee to contribute ideas concerning what should be taught in the school's vocational courses. |
| — | — | 11. It is important for the advisory committee to suggest what students need to learn in vocational courses before their work-experience begins. |
| — | — | 12. It is important for advisory committee members to advise the vocational teacher about the appropriateness of placing students with other employers for work-experience. |
| — | — | 13. It is important for members of the advisory board to advise the vocational teacher on ways to arouse public interest in the directed work-experience program. |
| — | — | 14. It is important for the advisory committee to help evaluate the success and effectiveness of the work-experience program. |
| — | — | 15. It is important for the employer and the vocational teacher to reach an understanding about the kind of work-experience to be provided by the employer. |
| — | — | 16. It is important that the employer interview and make the final selection of the student he wishes to employ for directed work-experience. |
| — | — | 17. It is important to inform a student fully about his duties and other conditions of employment before he starts directed work-experience. |
| — | — | 18. It is important for the vocational teacher to visit the employer and the student regularly at the place of business. |
| — | — | 19. It is important that the school instruct each student fully in safety precautions before he starts directed work-experience. |
| — | — | 20. It is important to record the terms of employment before a student begins work-experience and to get the student, employer, parent, and teacher to agree to the terms. |
| — | — | 21. It is important for the employer to make regular reports on the student's work performance and training progress. |

Cornell University

EMPLOYER QUESTIONNAIRE C

GENERAL DIRECTIONS: Each section below contains a number of items pertaining to directed work-experience programs offered as part of the high school's vocational program. In each section below you will find a list of things that might occur in a directed work-experience program. Your task is to rank items in each section below. Rank them by putting them in the order of their importance for the success and effectiveness of a directed work-experience program. Please base your opinion on your own personal experience with the directed work-experience program.

Finish each section completely before you proceed to the next section.

SECTION I

DIRECTIONS: Read the eight items in this section carefully. Then decide which item you consider to be most important to the success of directed work-experience for high school students. Write the number one (1) in the blank beside that item. Write the number two (2) beside the item you judge to be second in importance, etc. Continue in this way until you have given a rank of 1, 2, 3, 4, 5, 6, 7, or 8 for each of the eight items in this section. Be sure to rank each item; do not rank any two items alike.

RANK

- ___ a) Directed work-experience trains students in skills needed to do a particular job.
- ___ b) Directed work-experience emphasizes the development and improvement of student work habits.
- ___ c) To be eligible for directed work-experience, a student must show interest in making a career of the kind of occupation taught in the program.
- ___ d) Directed work-experience takes place in real work situations away from the school.
- ___ e) Students are paid regular wages for work performed as part of a directed work-experience program.
- ___ f) There is a close connection between the directed work-experience provided by the employer and the vocational courses taught in the school.
- ___ g) Directed work-experience lasts long enough for a student to learn to do a variety of job assignments.
- ___ h) The vocational teacher forms an advisory committee of employers who are interested in giving students directed work-experience.

SECTION II

DIRECTIONS: Read all six items in Section II carefully. Then rank all six items from 1-6 according to their importance for the success of a directed work-experience program. Give a rank of 1 to the most important item, a rank of 2 to the item that is second in importance, etc. Be sure to rank all six items. Be sure that you do not rank any two items the same. Record your responses in the blanks beside the items. When you complete Section II, go on to Section III.

RANK

- _____ a) The advisory committee of employers assist the vocational teacher in planning the establishment and policies of a directed work-experience program.
- _____ b) Advisory committee members contribute their ideas concerning what should be taught in the school's vocational courses.
- _____ c) The advisory committee helps in deciding what students need to learn in preparation for directed work-experience.
- _____ d) The advisory committee makes suggestions about the appropriateness of placing students in particular businesses for work-experience.
- _____ e) The advisory committee advises the vocational teacher on ways of arousing community interest in the work-experience program.
- _____ f) The advisory committee helps the teacher evaluate the success and effectiveness of the work-experience program.

SECTION III

DIRECTIONS: Read the seven items in Section III carefully. Then rank all seven items from 1 to 7 according to their importance to the success of a directed work-experience program. Rank the most important item as number 1; rank the item that is second in importance as number 2, etc. Be sure to rank all seven items; do not assign the same rank to any two items. Record your responses in the blanks beside the items.

RANK

- _____ a) Before a student is hired for work-experience, the employer and the vocational teacher agree on the experiences to be provided by the employer.
- _____ b) The employer interviews and makes the final selection of the student he wishes to employ for directed work-experience.

RANK

- _____ c) The employer informs the student fully about his duties and other conditions of employment before the student begins directed work-experience.
- _____ d) The vocational teacher visits the employer and the student regularly at the place of business.
- _____ e) The school instructs the student in all necessary safety precautions before placing him with an employer for directed work-experience.
- _____ f) Before a student begins directed work-experience, the terms of employment are recorded and agreed upon by the student, employer, parent, and teacher.
- _____ g) The employer makes regular reports on the student's work performance and progress to the vocational teacher.

CORNELL UNIVERSITY
Division of Agricultural Education
Department of Education

STUDENT QUESTIONNAIRE BOOKLET

Student's Name: _____
School: _____
Location: _____
Employer: _____

CORNELL UNIVERSITY
STUDENT QUESTIONNAIRES

Introduction

Please be sure that your name, school, school location, and employer's name are correctly filled out on the preceding page. Do this now.

This booklet contains four questionnaires:

- 1) Questionnaire A
- 2) Questionnaire B
- 3) Questionnaire C
- 4) An Index of Job Satisfaction

Please complete all four according to the directions given with each questionnaire.

On the questionnaires, you are asked to respond to items concerning Directed Work-Experience for high school students. To avoid confusion about the meaning of "directed work-experience", please read carefully the general description given below. Whenever you encounter the term "directed work-experience" in questionnaire items, it refers to the kind of program and activities described below.

Directed Work-Experience Programs

A directed work-experience program is a regular part of the high school's vocational education program. It is regulated by the school authorities, and it is operated by the vocational teacher with the help of cooperating employers. The purpose of directed work-experience is to give the vocational students an opportunity:

1. To practice on a real job the knowledge and skills they learn in school.
2. To increase their knowledge and job skills by working for an employer who is interested in helping the student to learn the job better.
3. To develop good work habits and attitudes through practice acquired during high school years.

In a directed work-experience program the teachers and employers cooperate in planning a program that will help the student prepare for the occupation he wishes to pursue. They decide together what needs to be taught in school in order to make the student's job experience a success. They decide together what the student needs to learn from job experience and how that learning can be accomplished on the job. And finally, they cooperate closely in putting these plans to work by giving the student a well-rounded program of school instruction, on-the-job instruction, and useful job experience.

PLEASE TURN THE PAGE, READ THE DIRECTIONS,
AND COMPLETE THE QUESTIONNAIRES.

Cornell University

STUDENT QUESTIONNAIRE A

DIRECTIONS: Answer the questions below by placing a check (✓) in the YES column or in the NO column.

- 1) Check YES if everything included in the question actually happened.
- 2) Check NO if everything included in the question did not actually happen. Check NO if only some of the things included in the question happened.

YES NO

- | | | |
|---|---|---|
| — | — | 1. Did your directed work-experience program actually prepare you for a particular kind of job? |
| — | — | 2. Did your directed work-experience program help you to decide what kind of work you want to do after graduation? |
| — | — | 3. Did you get paid regular wages for directed work-experience? |
| — | — | 4. Did your vocational classes teach the knowledge and skills that were useful and necessary on the job? |
| — | — | 5. Did you get enough directed work-experience to learn the skills needed to do the job? |
| — | — | 6. Did you get extra credit toward graduation for directed work-experience obtained as part of your vocational program? |
| — | — | 7. Did your vocational teacher and your employer work together in planning a directed work-experience program for you? |
| — | — | 8. Were special efforts made to acquaint the whole student body with the activities of the directed work-experience program? |
| — | — | 9. Before you enrolled in the vocational program, did the vocational teacher discuss the program with you? |
| — | — | 10. Before you enrolled in the vocational program, did the guidance counselor discuss the program with you? |
| — | — | 11. Did the vocational teacher contact your parents to inform them about the directed work-experience program and to get their help or cooperation? |
| — | — | 12. Was your class schedule arranged in advance to enable you to participate in directed work-experience? |

YES NO

- | | | | |
|---|---|-----|---|
| — | — | 13. | Did you get directed work-experience in a place that actually provided you with on-the-job instruction in job skills? |
| — | — | 14. | Did your school keep the people in the school district informed about the directed work-experience program through meetings, news articles, etc.? |
| — | — | 15. | Did your vocational teacher arrange for you to have a job interview with an employer who would provide you with directed work-experience? |
| — | — | 16. | Did you have an opportunity to discuss in vocational classes any problems that arose in directed work-experience? |
| — | — | 17. | Did your vocational classes teach you the kind of things you really needed to know on the job? |
| — | — | 18. | Did you learn in vocational classes at school the safety rules and regulations you need to know on the job? |
| — | — | 19. | Before beginning directed work-experience, were you informed exactly what your duties on the job would be? |
| — | — | 20. | Did your teacher visit you at work? |
| — | — | 21. | Did your employer report to your teacher on the quality of your work? |
| — | — | 22. | Were you required to keep a personal record of your wages, hours of work, and job assignments? |

Cornell University

STUDENT QUESTIONNAIRE B

DIRECTIONS: Each item below concerns directed work-experience as part of a vocational program in the high school. Read each item carefully and decide whether you agree or disagree with the statement. Answer the item as follows:

- a) If you agree with the statement made in an item, place a check (✓) in column one (I) next to the item.
- b) If you disagree with the statement made in an item, place a check (✓) in column two (II) next to the item.

If you disagree with any part of an item, your answer should be DISAGREE. Be sure to answer every item; do not omit any items; and make only one check (✓) per item.

Column
I II

- | | | | |
|---|---|----|--|
| — | — | 1. | It is important for the directed work-experience program to train a student for a particular kind of job. |
| — | — | 2. | It is important for the directed work-experience program to provide the student with the information and experience needed to decide the kind of job he wants to get after graduation. |
| — | — | 3. | It is important for the student to be paid regular wages for work done while learning a job on directed work-experience. |
| — | — | 4. | It is important for vocational classes in school to teach the knowledge and skills needed on the job. |
| — | — | 5. | It is important for students to stay on directed work-experience long enough for them to learn the skills needed to do the job. |
| — | — | 6. | It is important for the school to give extra credit toward graduation for completing directed work-experience requirements. |
| — | — | 7. | It is important for employers to help vocational teachers decide what students need to learn in the vocational program. |
| — | — | 8. | It is important to keep the whole student body informed about the directed work-experience program. |

Column
I II

- | | | | |
|---|---|-----|--|
| — | — | 9. | It is important to allow students to enroll in the directed work-experience program only if they want to get jobs in the kind of business where directed work-experience is given. |
| — | — | 10. | It is important to allow students to take the directed work-experience program only if they have a good chance of succeeding in the program and on the job. |
| — | — | 11. | It is important to inform parents about directed work-experience and obtain their cooperation in planning the program. |
| — | — | 12. | It is important to plan vocational students' class schedules in advance so that it is possible for them to obtain directed work-experience. |
| — | — | 13. | It is important for students to get work-experience only where the employer helps them to learn and practice a variety of useful job skills. |
| — | — | 14. | It is important to make special efforts to get the people in the school district interested in the progress of the work-experience program. |
| — | — | 15. | It is important for students to have a job interview with an employer before being placed in his business for directed work-experience. |
| — | — | 16. | It is important for vocational classes at school to spend class time on discussing problems that arise at work. |
| — | — | 17. | It is important for vocational classes to teach things the student needs to know on the job. |
| — | — | 18. | It is important for vocational classes at school to emphasize the safety rules and regulations that must be observed at work. |
| — | — | 19. | It is important for the employer to inform the student completely about his duties and assignments before directed work-experience begins. |
| — | — | 20. | It is important for the vocational teacher to visit the student on the job regularly. |
| — | — | 21. | It is important for the employer to keep the vocational teacher informed about the quality of the student's work and progress. |
| — | — | 22. | It is important for the student to keep a personal record of his wages, hours of work, and job assignments. |

Cornell University

STUDENT QUESTIONNAIRE C

GENERAL DIRECTIONS: If a high school vocational program gives directed work-experience in addition to regular vocational classes, some things in the program will be more important than others. In each section of this questionnaire you will find a list of things that might occur in a directed work-experience program. Your job is to rank the items in these lists according to the order of their importance. Read the directions for each section carefully; finish each section completely before you go on to the next section.

SECTION I

Directions: Read all six items in Section I carefully. Select the item which you consider to rank first in importance for a successful work-experience program; then write the number one (1) in the space provided beside that item. Give a score of 2 to the item that you think ranks second in importance, a score of 3 to the item that ranks third, etc. Continue in this way until you have ranked all six items. Be sure to answer all six items. Be sure that you do not give the same score to two different items.

- a) Directed work-experience prepares the student to do a particular kind of job.
- b) A directed work-experience program helps to provide information and experiences that a student needs to decide what kind of career he wants to pursue.
- c) Directed work-experience provides students with the opportunity to earn wages while learning a job.
- d) Vocational classes in school teach the knowledge and skills that each student needs to perform his own job.
- e) Directed work-experience lasts long enough for students to learn the skills they need to do the job.
- f) Students receive extra credit toward graduation for completing the directed work-experience requirement.

SECTION II

Directions: Read all eight items in Section II carefully. Rank all eight items from 1 to 8 according to their importance. Give a score of 1 to the most important item, a score of 2 to the item that is second in importance, etc. Be sure to answer all eight items. Be sure that you do not give the same scores to two different items.

- a) Employers who provide directed work-experience help teachers decide what students need to learn in the vocational program.

- ___ b) The whole student body is kept informed about activities and opportunities of the work-experience program.
- ___ c) Students are permitted to enroll for directed work-experience only if they want to get jobs in the kind of businesses where directed work-experience is given.
- ___ d) Students are permitted to obtain directed work-experience only if they have a good chance of succeeding in the program and on the job.
- ___ e) The teacher keeps parents informed about the directed work-experience program and obtains their cooperation in planning the student's program.
- ___ f) Vocational students' classes are scheduled in advance so that it is possible for them to obtain directed work-experience.
- ___ g) Students get directed work-experience only in a business where the employer will help them to learn and practice a variety of useful job skills.
- ___ h) Vocational teachers look for opportunities to interest the people of the school district in the progress of the directed work-experience program.

SECTION III

Directions: There are eight items in Section III. Read all eight items carefully. Then rank these items from 1 to 8 according to their importance. Give a score of 1 to the item that is most important for the success of a directed work-experience program, a score of 2 to the item that is second in importance, etc. Be sure to answer all eight items. Be sure that you do not give the same score to two different items.

- ___ a) The employer interviews the student before hiring him for directed work-experience.
- ___ b) The teacher provides an opportunity for students to discuss in class the problems that arise at work.
- ___ c) Vocational classes in school concentrate on teaching skills that the student needs on the job.
- ___ d) Vocational classes emphasize the safety rules and regulations that must be observed on the job.
- ___ e) Before on-the-job training begins, the employer informs the student about all the duties that the student must perform at work.
- ___ f) The vocational teacher makes regular visits to the student on the job.

- g) The employer keeps the vocational teacher informed about the quality of the student's work and progress.
- h) The student keeps a personal record of his wages, hours of work, and job assignments.

AN INDEX OF JOB SATISFACTION

DIRECTIONS: Some jobs are more interesting and satisfying than others. We want to know how people feel about different jobs. This questionnaire contains 18 statements about jobs. You are to circle the phrase below each statement that best describes how you feel about your present job. If you do not have a job now, then you should answer the items by indicating how you feel about the last job you had.

Example:

There are some things about my job that could be improved.
Strongly agree, agree, undecided, disagree, strongly disagree.

This is how you would answer the example:

- a) If you have really strong feelings about the need for improvement, you would circle strongly agree.
- b) If you merely feel that there is room for improvement, you would circle agree.
- c) If you are not sure whether your job conditions could stand improvement, you would circle undecided.
- d) If you feel that your job conditions are O.K. and do not need improving, you would circle disagree.
- e) If you have really strong feelings that your job conditions are good and don't need any improvement, you would circle strongly disagree.

Circle only one phrase per item.

Answer every item.

There are no right or wrong answers, and you will not be graded on your answers. We would simply like to know your honest opinion about each statement.

TURN THE PAGE AND BEGIN

1. My job is like a hobby to me.
Strongly agree, agree, undecided, disagree, strongly disagree.
2. My job is usually interesting enough to keep me from getting bored.
Strongly agree, agree, undecided, disagree, strongly disagree.
3. It seems that my friends are more interested in their jobs.
Strongly agree, agree, undecided, disagree, strongly disagree.
4. I consider my job rather unpleasant.
Strongly agree, agree, undecided, disagree, strongly disagree.
5. I enjoy my work more than my leisure time.
Strongly agree, agree, undecided, disagree, strongly disagree.
6. I am often bored with my job.
Strongly agree, agree, undecided, disagree, strongly disagree.
7. I feel fairly well satisfied with my job.
Strongly agree, agree, undecided, disagree, strongly disagree.
8. Most of the time I have to force myself to go to work.
Strongly agree, agree, undecided, disagree, strongly disagree.
9. I am satisfied with my job for the time being.
Strongly agree, agree, undecided, disagree, strongly disagree.
10. I feel that my job is no more interesting than others I could get.
Strongly agree, agree, undecided, disagree, strongly disagree.
11. I definitely dislike my work.
Strongly agree, agree, undecided, disagree, strongly disagree.
12. I feel that I am happier in my work than most other people.
Strongly agree, agree, undecided, disagree, strongly disagree.
13. Most days I am enthusiastic about my work.
Strongly agree, agree, undecided, disagree, strongly disagree.
14. Each day of work seems like it will never end.
Strongly agree, agree, undecided, disagree, strongly disagree.
15. I like my job better than the average worker does.
Strongly agree, agree, undecided, disagree, strongly disagree.
16. My job is pretty uninteresting.
Strongly agree, agree, undecided, disagree, strongly disagree.
17. I find real enjoyment in my work.
Strongly agree, agree, undecided, disagree, strongly disagree.
18. I am disappointed that I ever took this job.
Strongly agree, agree, undecided, disagree, strongly disagree.

DIRECTIONS: On each of the items below, please rate the student _____, who is in your employ under the auspices of the directed work-experience program. Rate the student by checking [X] the space that corresponds, in your opinion, to the best description of the quality of the student's on-the-job behavior. Rate the student in the following manner:

E = Excellent
G = Good
F = Fair
B/A = Below Average
U = Unsatisfactory

**Please give careful consideration to each item.
Please answer every item.**

ITEMS

RATINGS		STUDENT BEHAVIOR & PERFORMANCE		U
E	G	F	B/A	

1. Is the student courteous to supervisors? [] [] [] [] [] []
2. Is the student courteous to fellow workers? [] [] [] [] [] []
3. Is the student courteous to the public (e.g., customers)? [] [] [] [] [] []
4. Does the student help and cooperate with supervisors? [] [] [] [] [] []
5. Does the student help and cooperate with fellow workers? [] [] [] [] [] []
6. Does the student show interest in his work by doing even simple chores carefully? [] [] [] [] [] []
7. Does the student show interest in learning things that more experienced men on the job can teach him? [] [] [] [] [] []
8. Is the student dependable when left alone to do a job? [] [] [] [] [] []

ITEMS

		RATINGS				
		E	G	F	B/A	U
9.	Does the student ask for help or instruction, if he needs assistance to complete a task assigned to him?	[]	[]	[]	[]	[]
10.	Does the quality of the student's work indicate that he profits from instruction or correction on-the-job?	[]	[]	[]	[]	[]
11.	Does the student dress appropriately for the work to which he is assigned?	[]	[]	[]	[]	[]
12.	Does the student report for work on the days he agreed to work?	[]	[]	[]	[]	[]
13.	Does the student arrive at work on time?	[]	[]	[]	[]	[]
14.	Does the student settle down to work and apply himself to his assigned tasks?	[]	[]	[]	[]	[]
15.	Does the student care for tools and equipment properly?	[]	[]	[]	[]	[]
16.	Does the student handle tools and equipment safely?	[]	[]	[]	[]	[]
17.	Does the student follow directions?	[]	[]	[]	[]	[]
18.	Does the student exhibit ingenuity in dealing with difficult work problems?	[]	[]	[]	[]	[]
19.	Does the quality of the student's work meet standards required of regular employees?	[]	[]	[]	[]	[]

APPENDIX C

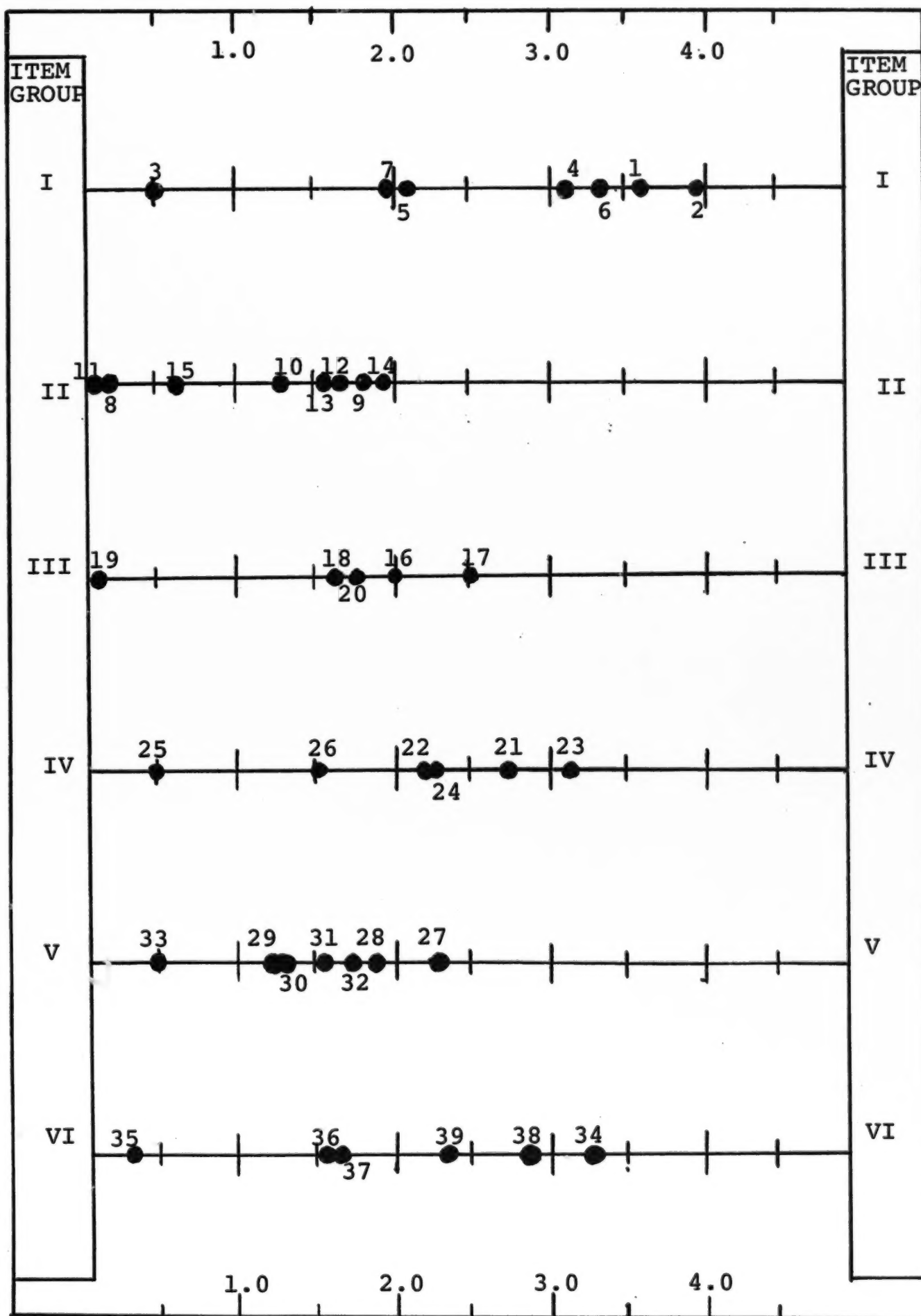
Section I Scale Values of Guidelines

Scale values are represented below for each group of respondents to the project questionnaires. The numbered points on the scales correspond to item numbers on the Guideline Questionnaires (A, B, C). Guideline scale values were computed separately for teacher-coordinators, students, and employers and were based upon a separate set of questionnaires designed specifically for each group. Questionnaire items differed for the three groups, since the items were selected on the basis of their relevance to a group's role in a program of directed work-experience.

Note that the Questionnaire item numbers by which the scale points are identified are not consistent between Student, Teacher, and Employer Questionnaires. The reader is cautioned, for example, against comparing the relative values of item number one across the student, teacher, and employer scales. To determine the guideline content of any item, the reader may most conveniently locate the item by number and response group in Student Questionnaire B, Teacher Questionnaire B, or Employer Questionnaire B.

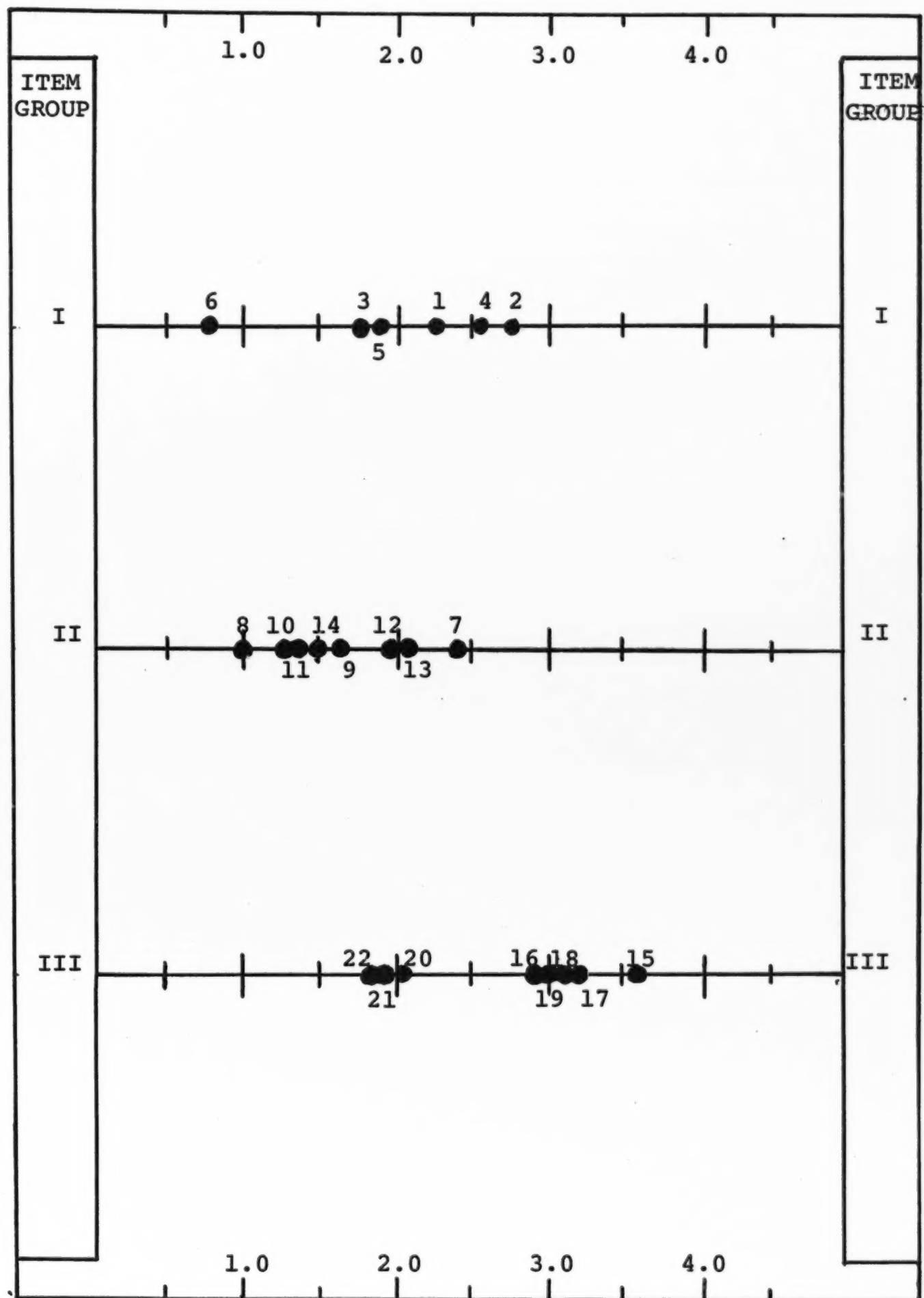
TEACHER EVALUATION OF GUIDELINES

Guideline Scale Values on a Judgmental Continuum of Importance



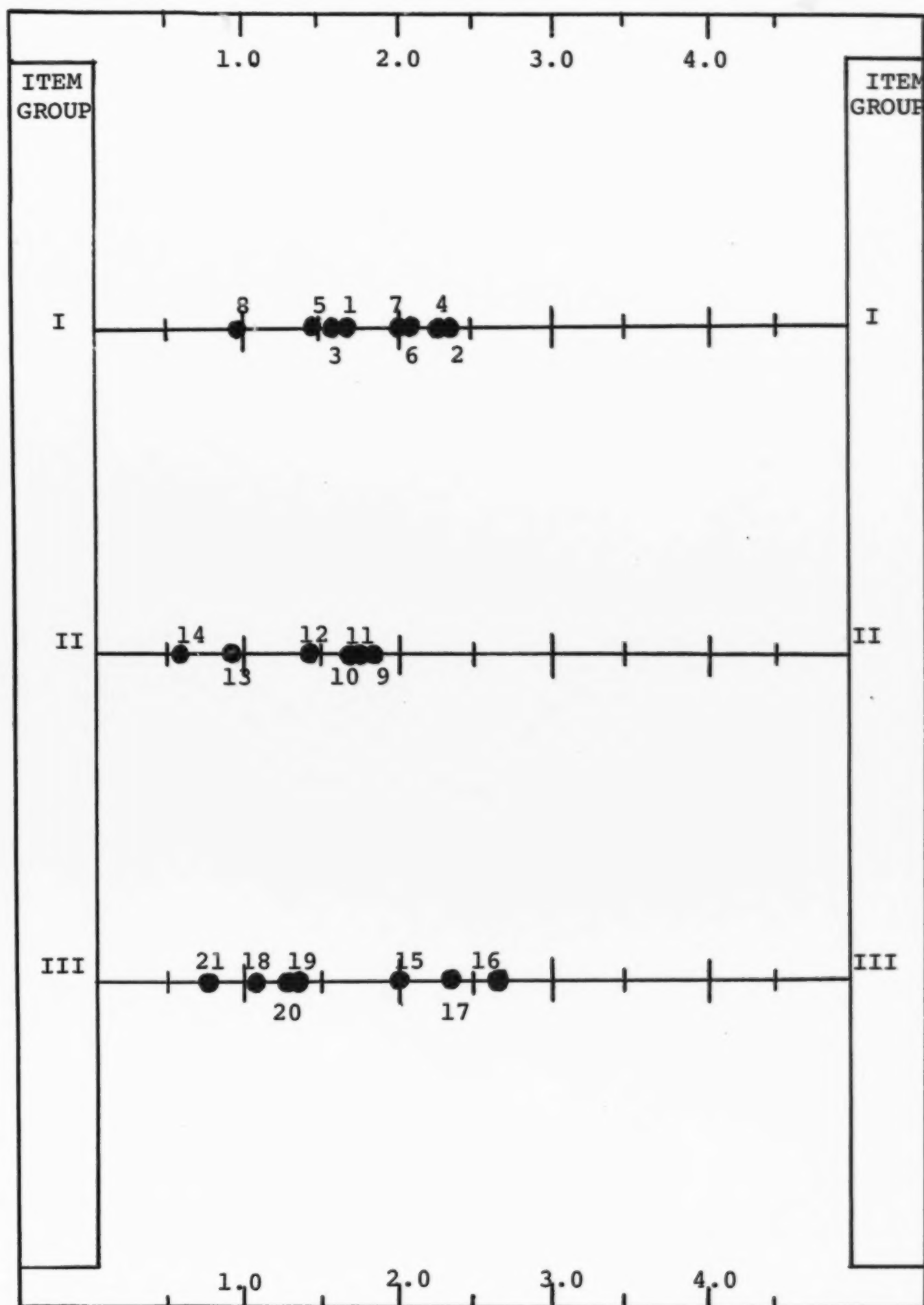
STUDENT EVALUATION OF GUIDELINES

Guideline Scale Values on a Judgmental Continuum of Importance



EMPLOYER EVALUATION OF GUIDELINES

Guideline Scale Values on a Judgmental Continuum of Importance



APPENDIX C

Section II

A Description of Scaling Analysis Methodology

Each individual guideline was assumed to lie on a continuum of psychological importance. The location of each guideline on that continuum was identified by the importance attributed to the guideline by project participants. Raw data for the scaling analysis of guideline importance was derived from participants' responses to the Student, Teacher, and Employer Questionnaires.

First of all, in order to identify the relative importance attributable to the guidelines, they were arranged into sets containing five to eight guidelines per set. Guidelines were grouped into sets on the basis of the reasonableness of comparing them with respect to importance for program success. Subjects were required to rank-order the guidelines contained in each set according to importance. Scale values were computed with respect to an arbitrary origin from the frequency with which each guideline was assigned to each rank level in its set. For each set of guideline items an item-by-rank frequency matrix was constructed. A second item-by-rank frequency matrix was derived from the first and contained the cumulative percentages of respondents who assigned each item at or below each successive rank. Finally, a third matrix was derived by substituting for each cumulative percentage the unit normal deviate to which the percentage corresponded. The scale values were computed with respect to an arbitrary origin directly from the matrix of unit normal deviates by one of two alternative procedures. Both procedures are described in detail by Torgerson in his treatment of Thurstone's Law of Categorical Judgment (Condition D).¹¹⁹ The selection of procedure depends on the characteristics of the matrix of unit normal deviates. One method deals with complete matrices of unit normal deviates; the other deals with incomplete matrices. All unit normal deviate matrices for both teachers and employers were incomplete, since at least one guideline item in each set was ranked higher than the lowest possible rank by all respondents. Completeness or incompleteness of the matrices has nothing to do with the absence of data. Incompleteness is a function of the asymptotic nature of the unit normal curve; there is no unit normal deviate corresponding to 100% of the area under the unit normal curve. All matrices based on student responses, on the other hand, were complete.

In order to establish for each subject sample a common point of origin for all arbitrary origin scales represented by the separate item groupings, subjects rated each guideline item categorically as important or unimportant to program success. The common point of origin for all scales is taken to be the point on each arbitrary origin scale that marks the cut-off between "important" and "unimportant" items. First of all, for each guideline item the percentage of subjects who judged the item to be important was transformed to a unit normal deviate, the item's categorical scale value.

Then for teachers, for students, and for employers, each guideline item was located in the bivariate scale space. The coordinates of the bivariate plot were the scale of unit normal deviates (categorical scale values) and the values of the arbitrary origin scales. A straight line, subject to at least squares requirement, was fitted to the plot of points in the bivariate scale space. The intercept of this line and the axis of the arbitrary origin scale represented a "rational" origin or zero point on the arbitrary origin scale;¹²⁰ this point is the cut-off between item-importance and item-unimportance on the scale that measured the relative magnitude of a guideline's contribution to program success in respondents' judgment.

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PERSONAL AUTHOR(S) Cushman, H. R. Hill, C. W. Miller, J. K.					
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IDENTIFIERS Tentative guidelines & procedures for directed work-experience programs. Concerns & expectations of prospective participants in directed work-experience programs. Manual for teacher-coordinators.					
ABSTRACT The project had three objectives: the development of empirically tested guidelines and procedures for initiating, developing & operating programs of directed work-experience for secondary students in off-farm agricultural occupations; the evaluation of the effectiveness of work-experience with respect to relevant educational & occupational criteria; and the effect of the extent of work-experience on educational & occupational criteria. The effectiveness of the guidelines & procedures as a structural model for programs of remunerative, supervised work-experience in out-of-school, commercial settings was emphatically endorsed by participating teachers, students & employers. Comparison of students engaged in directed work-experience with students enrolled in similar programs that did not feature work-experience yielded significant differences on 3 criteria. Participants in directed work-experience evidenced superior achievement in technical knowledge, a higher rate of entry into curriculum-related employment after graduation, & a higher rate of entry into curriculum-related programs of advanced training. Finally, when participants in directed work-experience were left free to regulate the duration of work-experience, no differences were observed in the criterion performance of "high" and "low" experience groups.					